Notes on Tiliaceae in Australia, 4. A revision of the stellate-haired species of the genus *Corchorus* L.

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Summary

Halford, D.A. (2004). Notes on Tiliaceae in Australia, 4. A revision of the stellate-haired species of the genus *Corchorus* L. *Austrobaileya* 6 (4): 581–629. Twenty-two species are recognised and a key is provided for their identification. The following species are newly described: *C. aulacocarpus* Halford, *C. carnarvonensis* Halford, *C. congener* Halford, *C. incanus* Halford, *C. lasiocarpus* Halford, *C. mitchellensis* Halford, *C. obclavatus* Halford, *C. puberulus* Halford, *C. subargentus* Halford, *C. sublatus* Halford and *C. tectus* Halford. Three new combinations *C. sericeus* subsp. *densiflorus* (Benth.) Halford, based on *C. walcottii* var. *densiflorus* Benth.; *C. sidoides* subsp. *rostrisepalus* (Domin) Halford, based on *C. rostrisepalus* Domin; *C. sidoides* subsp. *vermicularis* (F.Muell.) Halford, based on *C. vermicularis* F.Muell., are made. Two new subspecies are described: *C. incanus* subsp. *lithophilus* Halford and *C. lasiocarpus* subsp. *parvus* Halford. All new taxa are illustrated, while all taxa are described and mapped, and notes on their distribution, habitat and phenology are given. Lectotypes are chosen for *Nettoa crozophorifolia* Baill., *C. elderi* F.Muell., *C. pumilio* R.Br. ex Benth., *C. rostrisepalus* Domin, *C. sidoides* F.Muell., *C. tomentellus* F.Muell., *C. walcottii* F.Muell. and *C. walcottii* var. *densiflorus* Benth. All known synonyms are listed here including manuscript names that were used to identify taxa prior to their formal naming in this publication.

Key words: Tiliaceae, *Corchorus*, Australian flora, taxonomy, nomenclature

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Introduction

This is the fourth paper in a series examining the family Tiliaceae in Australia and the second concerned with the genus *Corchorus* L. This paper examines the stellate-haired species of *Corchorus*. The taxonomy of the other Australian species (simple-haired species) were dealt with in Halford (1995). A brief history of the taxonomy of the Australian representatives of this genus was also presented in that paper. All species treated here are endemic to Australia. Taxonomic problems certainly remain in the stellate-haired species of *Corchorus* in Australia and there is need for further collection and study throughout the range of the group, especially in the Pilbara and Kimberley regions of Western Australia and Arnhem Land, Northern Territory. Such field investigations are beyond the resources of the present author. A total of 35 species (13 simple-haired and 22 stellate-haired) are recognised as occurring in Australia.

Accepted for publication 7 March 2004

Materials and methods

This revision is based on an assessment of morphological characters of approximately 700 dried herbarium collections and collections and field studies undertaken by the author in 1992 and 1993. Collections from the following herbaria were studied: AD, BRI, CANB, DNA, K, MEL, NSW, P and PERTH. These herbarium acronyms follow Holmgren *et al.* (1990). All specimens cited have been seen unless otherwise indicated (as *n.v.*).

The species treated in the present paper are listed alphabetically. Descriptions of colour of vegetative and flora parts are either from the herbarium labels or from photographs taken by the author during field studies. Measurements listed are based upon the total variation observed in the herbarium specimens examined. Plant size, flowering and fruiting times, and habitat information were obtained from herbarium labels. All measurements were made from dried material, material preserved in 70% ethanol or dried material reconstituted by placing in boiling water for a few minutes. The distribution maps are based on herbarium specimen locality data.

Taxonomy

Key to stellate-haired *Corchorus* in Australia

1. Sepals persistent in fruit 2
   Sepals not persistent in fruit 9

2. Glandular hairs yellow or red-brown, conspicuous, on either stems, petioles, peduncles, pedicels or abaxial surface of sepals 3
   Glandular hairs white and inconspicuous or absent 4

3. Sepals < 9 mm long (W.A.) ..... **13. C. parviflorus**
   Sepals > 9 mm long (W.A.) ..... **8. C. laniflorus**

4. Annulus densely stellate-pubescent (W.A.) ..... **4. C. crozophorifolius**
   Annulus glabrous or with a few scattered hairs 5

5. Fruits < 5 mm long, with indumentum of stellate hairs; ovary 3 or 4-locular; ovules < 10 in each locule 6
   Fruits > 5 mm long, with indumentum of stellate and dendritic-stellate hairs; ovary 3 to 5-locular; ovules 10–25 in each locule 7

6. Leaf laminae narrowly to broadly ovate or ovate-elliptic (N.T., Qld) ..... **16. C. sericeus**
   Leaf laminae narrowly oblong to oblong (W.A.) ..... **20. C. tectus**

7. Fruits ≥ 12 mm across (including indumentum) (W.A.) ..... **9. C. lasiocarpus**
   Fruits < 12 mm across (including indumentum) 8

8. Leaf laminae narrowly oblong to oblong or narrowly ovate, 0.4–2.5 cm wide, l:w ratio ≥ 2:1 (W.A.) ..... **9. C. lasiocarpus**
   Leaf laminae ovate to very broadly ovate, 2–7 cm wide, l:w ratio < 2:1 (W.A.) ..... **7. C. incanus**

9. Fruits with indumentum of stellate and dendritic-stellate hairs 10
   Fruits with indumentum of stellate hairs only 13

10. Glandular hairs present on stems, petioles, peduncles, pedicels or abaxial surface of sepals (W.A.) ..... **22. C. walcottii**
    Glandular hairs absent 11

11. Fruits subcylindrical, 10–18 mm long, 1.5–2.5 m across (including indumentum), 5–12 times longer than wide (W.A.) ..... **3. C. congener**
    Fruits narrowly to broadly ellipsoid or narrowly ovoid, 4–10 mm long, 1–8 mm across (including indumentum), < 5 times longer than wide 12

12. Fruits ellipsoid to broadly ellipsoid, 4–8 mm across (including indumentum), 4 or 5-valved; inflorescences 2 or 3-flowered; pedicels 2–7 mm long; adaxial surface of leaf laminae glabrous or with a sparse indumentum (epidermis clearly visible) (N.T., Qld) ..... **6. C. elderi**
    Fruits narrowly ellipsoid or narrowly ovoid, 1–4 mm across (including indumentum), 3(rarely 4)-valved; inflorescences 3–7-flowered; pedicels 1–2 mm long; adaxial surface of leaf laminae with a moderately dense to dense indumentum (epidermis not visible) (W.A.) ..... **5. C. elachocarpus**

13. Fruits obtusely angled in transverse section, usually < 10 times as long as wide, not constricted between the seeds 14
Fruits circular in transverse section, mostly 10 or more times as long as wide, slightly or markedly constricted between the seeds 15

14. Leaf laminae ovate, 2–5 cm wide, l:w ratio ≤3:1, margin serrate to serrulate; sepals 9–15 mm long; petals 9–10 mm long, 4–7 mm wide (W.A.) ... **14. C. puberulus**
Leaf laminae narrowly ovate, 0.8–2.5 cm wide, l:w ratio 3–7:1, margin serrulate; sepals 6–9 mm long; petals 6–7 mm long, 2–4 mm wide (N.T.) ..... **1. C. aulacocarpus**

15. Fruits < 15 mm long 16
Fruits ≥ 15 mm long 18

16. Shrubs to 2 m high; branchlets erect; leaf laminae narrowly ovate, 3–9 cm long; fruits obclavate (N.T.) ..... **12. C. obclavatus**
Shrubs mostly to 1 m high; branchlets spreading or if erect then leaf laminae oblong or oblong-elliptic, 0.6–3.5 cm long or if ovate and ≥ 3.5 cm long then fruits cylindrical 17

17. Indumentum on young shoots and buds ferruginous or if greyish white then either abaxial surface of sepals obscured by dense indumentum or leaf laminae narrowly ovate to ovate and > 1.5 cm wide; stamens > 20 (W.A., N.T., Qld) ..... **17. C. sidoides**
Indumentum on young shoots and buds greyish white, or if ferruginous then abaxial surface of sepals not completely obscured by indumentum; leaf laminae oblong, oblong-elliptic or narrowly elliptic and ≤ 1.5 cm wide; stamens mostly < 20 (W.A., N.T., Qld) ..... **15. C. pumilio**

18. Sepals ≥ 12 mm long (W.A.) ..... **10. C. leptocarpus**
Sepals < 12 mm long 19

19. Apex of mature fruits erect or ascending 20
Apex of mature fruits orientated downward 22

20. Stellate hairs up to 1.5 mm across; leaves soft to the touch; fruits 3–4 mm across (including indumentum) (W.A.) ..... **11. C. mitchellensis**
Stellate hairs up to 0.5 mm across; leaves felt-like to the touch; fruits 1–2.5 mm across (including indumentum) 21

21. Peduncles 2–5 mm long (N.T.) ..... **19. C. sublatus**
Peduncles 7–15 mm long (Qld) ..... **18. C. subargentus**

22. Sepals 9–11 mm long, 2–3 mm wide; flower buds 3–6 mm across; indumentum on young shoots ferruginous; fruits 2–3 mm across, not conspicuously constricted between seeds; stamens > 80 (W.A.) ... **2. C. carnarvonensis**
Sepals < 9 mm long, 1–2 mm wide; flower buds 1–3 mm across; indumentum on young shoots white or if ferruginous then fruits < 2 mm across and slightly to markedly constricted between seeds; stamens < 70 23

23. Leaf laminae ovate, 1.3–2 times as long as wide; indumentum moderately dense on adaxial surface of leaf (epidermis clearly visible); fruits 0.7–1.5 mm across (including indumentum) (Qld) ..... **21. C. tomentellus**
Leaf laminae oblong, oblong-elliptic, ovate-elliptic or if ovate then more than 2.5 times as long as wide and with a dense indumentum (epidermis not visible); fruits 1–2.5 mm across (including indumentum) (W.A., N.T., Qld) ..... **17. C. sidoides**

1. Corchorus aulacocarpus Halford **sp. nov.** similis *C. leptocarpo* autem fructibus latioribus (3–4 mm latis comparitis 2–3 mm latis) minus quam 10 plo longioribus quam latis, in sectione transversali trigonis vel tetragonis non circularibus, inter semina non constrictis differt. *Corchorus aulacocarpus* floribus ex sepalis 6–9 × 1–2 mm, petalis 6–7 × 2–4 mm, filamentis staminalibus 3–4 mm longis, stylo 2–4 mm longo compositis, pedunculis 2–3 mm longis, foliis 0.8–2.5 cm latis praeditus ut videtur maxime arcte affinis *C. puberulo* qui flores majores ex sepalis 9–15 × 2–3 mm, petalis 9–10 × 4–7 mm, filamentis staminalibus 4–6 mm longis, stylo 4–6 mm longo compositos, pedunculos longiores 2–4 mm longos, folia interdum latiores 2–5 lata habet. **Typus:** Northern Territory. DARWIN AND GULF REGION: Mt Basedow Range, 1 June 1973, *T.G. Hartley* 13886 (holo: DNA; iso: CANB).

Shrub to 2 m high; stems sparingly branched, erect; young shoots with ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts greyish-white, dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.2 mm across; stipes red-brown, straight, up to 0.2 mm long; rays pliable, white or ferruginous, up to 0.1 mm long. Leaves with petioles 5–12 mm long; stipules linear, 3–5 mm long; lamina narrowly ovate, 4–10 cm long, 0.8–2.5 cm wide, l:w ratio 3–7:1, discolorous; base rounded or rarely cordate; margin serrulate; apex acute or rarely obtuse. Inflorescences umbellate, 5–9-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 2–3 mm long; pedicels 2–4 mm long; bracts filiform-linear, 3–4 mm long. Flower buds obovoid-ellipsoid, 4–5 mm across, longitudinally ridged; apex obtuse with 5 spreading caudae to 1 mm long. Sepals 5, not persistent, narrowly obovate, 6–9 mm long, 1–2 mm wide; abaxial surface with a moderately dense to dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface glabrous or sometimes sparsely stellate-pubescent proximally; apex acuminate-caudate, up to 1 mm long. Petals 5; lamina narrowly obovate to obovate, 6–7 mm long, 2–4 mm wide, glabrous; claw c. 1 mm long, stellate-pubescent on margins. Androgynophore 0.2–0.3 mm long; annulus sinuate or entire, 0.2–0.3 mm long, glabrous. Stamens 45–60; filaments 3–4 mm long; anthers c. 0.5 mm long. Ovary subcylindrical, 0.7–1 mm across, densely stellate-puberulous, 3(rarely 4)-locular, with 26–32 ovules in each locule; style 2–4 mm long. Fruits on recurved pedicels, subcylindrical, 8–18 mm long, 3–4 mm across, 2–6 times longer than wide, curved or straight, 3 or 4-sided, obtusely-angled in transverse section, longitudinal sulcate, not constricted between seeds, 3(rarely 4)-valved; apex obtuse or rounded, orientated upward; indumentum moderately dense to dense, of stellate hairs up to 0.3 mm long. Seeds compressed obovoid or columnar, 1–2 mm long. **Fig. 1.**

***Additional specimens*: Northern Territory.** DARWIN AND GULF REGION: c. 12 miles [c. 19 km] S [of] Mt Brockman, Jul 1972, *Byrnes* 2713 (CANB, DNA); Mt Basedow, 20 km SE of Cooinda, Jun 1980, *Craven* 6310 (CANB, DNA); Kakadu NP, Upper Koolpin Creek, Jun 1988, *Russell-Smith* 5509 & *Lucas* (BRI, DNA); 1/4 mile [c. 0.4 km] SW [of] El Sharana, Jan 1973, *Martensz & Schodde* AE451 (BRI, CANB); 4 miles [c. 6 km] NW [of] El Sharana, Pine Creek road, Jan 1973, *Martensz & Schodde* AE503 (BRI, CANB); 2 km SE of El Sharana Mine, Apr 1992, *Halford* Q1172 (BRI); 10 miles [c. 16 km] ESE [of] Noranda Mining Camp, Jun 1972, *Schodde* AE60 (CANB, DNA).

***Distribution and habitat*:** *Corchorus aulacocarpus* is confined to Arnhem Land, Northern Territory from Mt Brockman southwards to El Sharana (**Map 4**). It is recorded as growing in woodland communities with spinifex groundcover on shallow sandy soils, and in *Allosyncarpia* forest on talus slopes and on broken sandstone ridges.

***Phenology*:** Flowers have been recorded from January and June, fruits from January, April, June and July.

***Affinities*:** *Corchorus aulacocarpus* is similar to *C. leptocarpus* but differs from that by having broader fruits (3–4 mm across compared with 2–3 mm across) which are < 10 times as long as wide, trigonous or tetragonous rather than circular in transverse section and are not constricted between the seeds. *Corchorus aulacocarpus* seems most closely related to *C. puberulus* but differs from that by having smaller flowers (sepals 6–9 × 1–2 mm, petals 6–7 × 2–4 mm, staminal filaments 3–4 mm

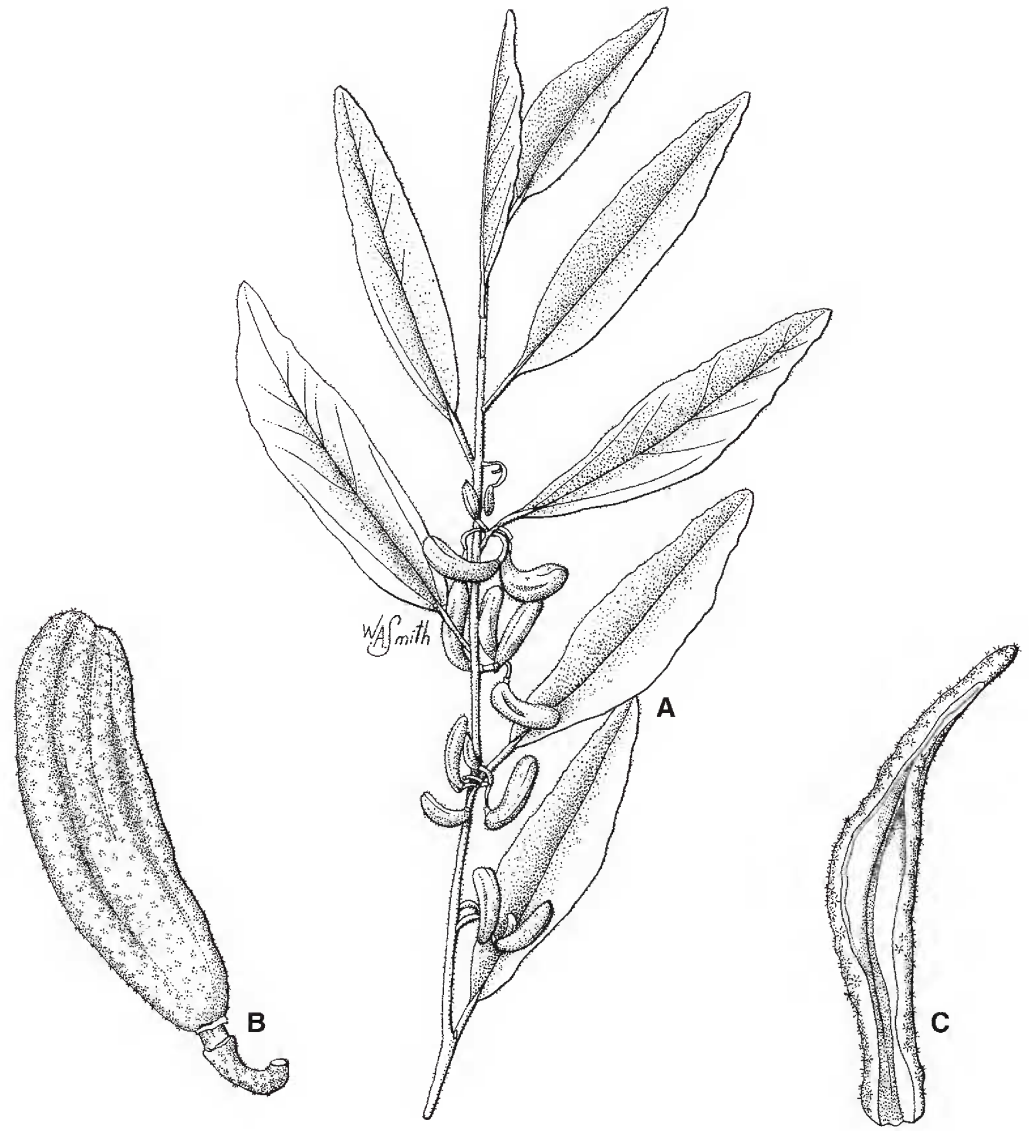

Fig. 1. ***Corchorus aulacocarpus.*** A. branchlet with fruit. × 1. B. fruit. × 4. C. ventral view of sepal. × 8. A, B from *Craven* 6310 (DNA); C from *Hartley* 13886 (DNA). Del. W. Smith.

long, style 2–4 mm long compared with sepals 9–15 × 2–3 mm, petals 9–10 × 4–7 mm, staminal filaments 4–6 mm long, style 4–6 mm long), shorter peduncles (2–3 mm long compared with 5–7 mm long) and generally narrower leaves (0.8–2.5 cm wide compared with 2–5 cm wide).

***Etymology*:** The specific epithet refers to the longitudinal furrows on the fruit of the species; Greek *aulacos* furrowed, *karpos* fruit.

2. Corchorus carnarvonensis Halford **sp. nov.** videtur arcte affinis *C. sidoidi* et *C. congenero*, ab illo alabastris majoribus (3–6 mm diam. non 1–3 mm diam.), sepalis majoribus (9–11 × 2–3 mm non 3–8 × 1–2 mm), petalis majoribus (6–9 × 4–5 mm non 2–7 × 0.5–4) ab hoc fructibus interdum grandioribus (15–35 × 2–3 mm non 10–18 × 1–2 mm), pilis tantum stellatis non stellato-dendriticis et stellatis vesititis, sepalis majoribus (8–11 × 2–3

non 1–18 × 1–2 mm) differt. **Typus:** Western Australia. CARNARVON DISTRICT: near Carnarvon, 22 August 1967, *A.M. Ashby* 2321 (holo: PERTH; iso: AD).

Shrub to 0.8 m high; stems much branched, spreading; young shoots with ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, dense, comprised of mostly stellate hairs but dendritic-stellate hairs also occasionally present. Stellate hairs sessile or stipitate, up to 0.5 mm across; stipes red-brown, straight up to 0.4 mm long; rays firm, white or ferruginous, up to 0.3 mm long. Leaves with petioles 7–15 mm long; stipules subulate-linear, 4–5 mm long; lamina narrowly oblong or narrowly ovate, 2.5–6 cm long, 0.9–2.4 cm wide, l:w ratio 2.5–3.5:1, concolorous; base rounded; margin serrate; apex acute to obtuse. Inflorescences umbellate, 4–6-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 3–5 mm long; pedicels 5–7 mm long, spreading to erect in flower, spreading to recurved in fruit; bracts filiform-linear, 2–3 mm long. Flower buds obovoid-ellipsoid, 3–6 mm across; apex obtuse with 5 spreading caudae to 1 mm long. Sepals 5, not persistent, narrowly obovate, 9–11 mm long, 2–3 mm wide; abaxial surface with a dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface stellate-puberulous proximally, glabrous distally; apex acute or acuminate-caudate, up to 1 mm long. Petals 5; lamina obovate, 6–9 mm long, 4–5 mm wide, glabrous; claw c. 1 mm long, sparsely stellate-pubescent. Androgynophore c. 0.2 mm long; annulus entire, c. 0.2 mm long, glabrous or with scattered minute simple hairs. Stamens 100–120; filaments 4–6 mm long; anthers c. 0.6 mm long. Ovary cylindrical, c. 0.5 mm across, densely stellate-puberulous, 3(rarely 4)-locular, with 20–28 ovules in each locule; style c. 4 mm long. Fruits subcylindrical, 15–35 mm long, 2–3 mm across, 5–15 times longer than wide, curved, circular in transverse section, slightly constricted between seeds, 3(rarely 4)-valved; apex rounded to obtuse, orientated downward; indumentum dense, of stellate hairs up to 0.5 mm long. Seeds compressed obovoid, 1–2 mm long. **Fig. 2.**

***Additional specimens*: Western Australia.** CARNARVON DISTRICT: 170 km N of Carnarvon junction, Oct 1989, *Nordenstam & Anderberg* 273 (PERTH); 19.7 km S of Coral Bay turnoff, Aug 1977, *Chinnock* 3817 (AD); just N of One Mile Jetty, Carnarvon, Aug 1986, *Chinnock* 6772 (AD); Gascoyne R. flats, Carnarvon, May 1962, *Aplin* 1556 (PERTH); Browns Range, near Carnarvon, Sep 1967, *Hawson* 9 (PERTH); c. 11 km SE of Carnarvon on Geraldton road, adjacent Motor Cycle Club course, Oct 1983, *Forbes* 1573 (MEL).

***Distribution and habitat*:** *Corchorus carnarvonensis* occurs in the north west of Western Australia from near Coral Bay southwards to Carnarvon. A single specimen of this species is labelled as originating from the Port Hedland area (*Runich* [PERTH1523708]). This locality is outside the 'normal' range of this species. The locality is considered to be doubtful and has not been mapped (**Map 3**). The species is recorded as growing in shrubland communities, in sandy soils, on plains and river flats.

***Phenology*:** Flowers and fruits have been collected from August to October.

***Affinities*:** *Corchorus carnarvonensis* seems most closely related to *C. sidoides* and *C. congener*. It can be distinguished from *C. sidoides* by its larger floral buds (3–6 mm across compared with 1–3 mm across), and larger sepals and petals (sepals 9–11 × 2–3 mm compared with 3–8 × 1–2 mm; petals 6–9 × 4–5 mm compared with 2–7 × 0.5–4 mm). For features distinguishing *C. carnarvonensis* from *C. congener* see 'Affinities' section under that species.

***Etymology*:** The specific epithet is derived from the name Carnarvon, plus the suffix *-ensis* indicating place of origin, alluding to the Carnarvon Botanical Province in Western Australia where this species occurs.

3. Corchorus congener Halford **sp. nov.** videtur maxime arcte affinis *C. sidoidi* et *C. carnarvonensi*; ab utroque fructibus stellato-dendriticis vestitis (stellatis tantum in fructibus *C. carnarvonensis* et *C. sidoidis*), et a *C. carnarvonensi* sepalis minoribus (5–8 × 1–2 mm comparitis 9–11 × 2–3 mm), interdum fructibus minoribus (10–18 × 1.5–2.5 mm comparitis 15–35 × 2–3 mm). *Corchorus congener* quoque similis *C. elachocarpo*

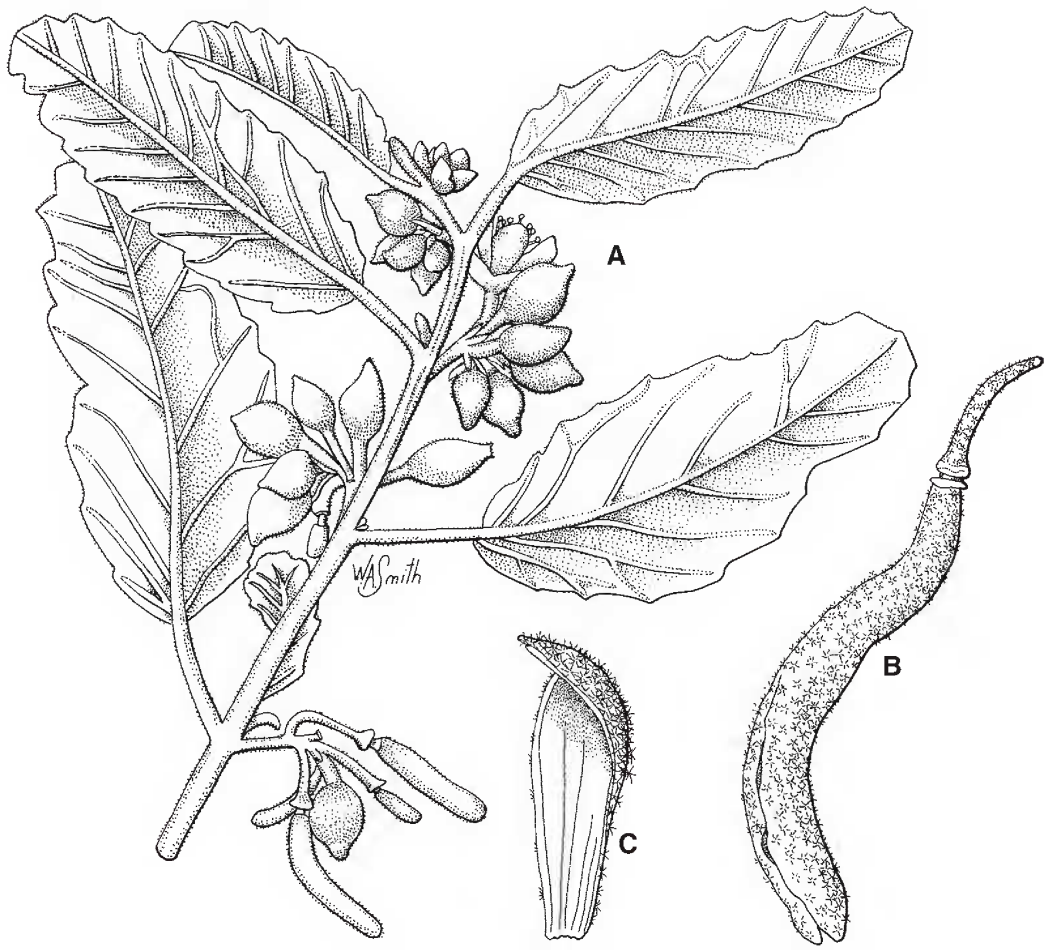

Fig. 2. ***Corchorus carnarvonensis.*** A. branchlet with flowers and immature fruit. × 2. B. fruit. × 3. C. ventral view of sepal. × 6. A from *Chinnock* 3817 (AD); B, C from *Ashby* 2321 (AD). Del. W. Smith.

autem fructibus cylindricis non anguste ellipsoideis vel anguste ovoideus pilis stellato-dendriticis usque 1.5 mm longis non usque 3 mm longis vestitis differt. **Typus:** Western Australia. FORTESCUE DISTRICT: N of Yardie Creek, 27 May 1965, *A.S. George* 6671 (holo: PERTH).

Corchorus interstans Halford ms, Paczkowska & Chapman (2000).

Shrub to 0.6 m high; stems much branched, spreading; young shoots with grey-white or ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.5 mm across; stipes red-brown, straight, up to 0.5 mm long; rays pliable, white or ferruginous, up to 0.3 mm long. Leaves with petioles 5–10 mm long; stipules subulate-linear, 3–5 mm long; lamina narrowly oblong or narrowly ovate, 1.6–5 cm long, 0.5–1.2 cm wide, l:w ratio 3–5:1, discolorous; base rounded to obtuse; margin serrulate; apex obtuse. Inflorescences umbellate, 4–6-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 3–7 mm long; pedicels 1–5 mm long, spreading to erect in flower, spreading to recurved in fruit;

bracts filiform-linear, 1–3 mm long. Flower buds obovoid-ellipsoid, 3–4 mm across; apex acute with 5 erect caudae to 0.2 mm long. Sepals 5, not persistent, narrowly obovate-elliptic, 5–8 mm long, 1–2 mm wide; abaxial surface with a moderately dense to dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface glabrous except for a few scattered stellate hairs proximally; apex acute or acuminate-caudate, up to 1 mm long. Petals 5; lamina obovate, 5–7 mm long, 3–5 mm wide, glabrous; claw 0.6–0.7 mm long, stellate-pubescent on margins. Androgynophore c. 0.3 mm long; annulus entire, c. 0.2 mm long, glabrous or with scattered minute simple hairs. Stamens 45–65; filaments 3–5 mm long; anthers c. 0.5 mm long. Ovary trigonal-cylindrical, c. 0.7 mm across, densely stellate puberulous, 3-locular, with 14–18 ovules in each locule; style 3–4 mm long. Fruits subcylindrical, 10–18 mm long, 1.5–2.5 mm across, 5–12 times longer than wide, curved, ± circular in transverse section, not conspicuously constricted between seeds, 3-valved; apex rounded to obtuse; indumentum dense, of stellate and dendritic-stellate hairs; dendritic-stellate up to 1.5 mm long, with stipes pale yellow, tortuous; rays white, up to 0.2 mm long, pliable. Seeds compressed obovoid, 1–2 mm long. **Fig. 3.**

***Selected specimens (from 11 examined)*: Western Australia.** Fortescue District: Barrow Island, Nov 1965, *Clay & Yardar* s.n. [PERTH1522051] (PERTH). Carnarvon District: W side of Cape Range, ± 1 mile [c. 1.6 km] S of lighthouse, Jun 1961, *George* 2563 (PERTH); Exmouth, Oct 1975, *Weber* 4992 (AD); ± 6 miles [c. 10 km] E of Ningaloo Station Homestead, Sep 1970, *George* 10229 (PERTH); 5–6 miles [c. 8–10 km] S of Exmouth, May 1965, *George* 6604 (PERTH); Rough Range, c. 7 km by road S of Exmouth Homestead on main Exmouth–Carnarvon road, Aug 1977, *Barker* 2134 (AD, MEL, NSW).

***Distribution and habitat*:** *Corchorus congener* is confined to north-west of Western Australia, from Ningaloo Station north-east to Barrow Island (**Map 7**). It is recorded as growing in open shrubland and hummock grassland communities, mostly on sandy plains and sand dunes but also on loamy soils derived from limestone.

***Phenology*:** Flowers have been collected from April to June and August to November, fruits in May, August, October and November.

***Affinities*:** *Corchorus congener* seems most closely related to *C. sidoides* and *C. carnarvonensis* but differs from both by having dendritic-stellate hairs on the fruit (only stellate hairs present on the fruits of *C. carnarvonensis* and *C. sidoides*). In addition, *C. congener* differs from *C. carnarvonensis* by having smaller sepals (5–8 × 1–2 mm compared with 9–11 × 2–3 mm), and generally smaller fruit (10–18 × 1.5–2.5 mm compared with 15–35 × 2–3 mm). *Corchorus congener* is also similar to *C. elachocarpus* but differs from that by having cylindrical rather than narrowly ellipsoid or narrowly ovoid fruit with dendritic-stellate hairs up to 1.5 mm rather than up to 3 mm long.

***Notes*:** The collection *Donnell* [MEL1599012] (MEL) from "near the Ord River", is noted here because it is similar to *C. congener* in having narrowly oblong leaves and 3-valved subcylindrical fruits with an indumentum of stellate and dendritic-stellate hairs. However, it differs from *C. congener* in having smaller flowers and a sparser indumentum on its branchlets and leaves. It is also somewhat disjunct from the known populations of *C. congener* in north-west Western Australia. The Donnell collection would appear to represent an undescribed taxon, however, further collections are required before it is formally recognised.

***Etymology*:** The specific epithet alludes to the similarity of this species to *C. carnarvonensis*; Latin *congener* of the same kind.

4. Corchorus crozophorifolius (Baill.) Burret, Notizbl. Bot. Gart., Berlin 12: 166 (1934), ('*chrozophorifolius*'); *Nettoa crozophorifolia* Baill., Adansonia 6: 238 t.7 (1866). **Type:** [Western Australia.] Nova Holland, ile sterile, *Leschenault* [Baudin Expedition] (lecto, here chosen: P; isolecto: P).

Corchorus crassifolius Domin, Biblioth. Bot. 89: 384 (1928). **Type:** [Western Australia.] upper Murchison River near Mt Hall, 1884, *C. Crossland* (holo: K; iso: MEL).

Shrub to 1 m high; stems much branched, spreading to erect; young shoots with ferruginous indumentum. Indumentum on

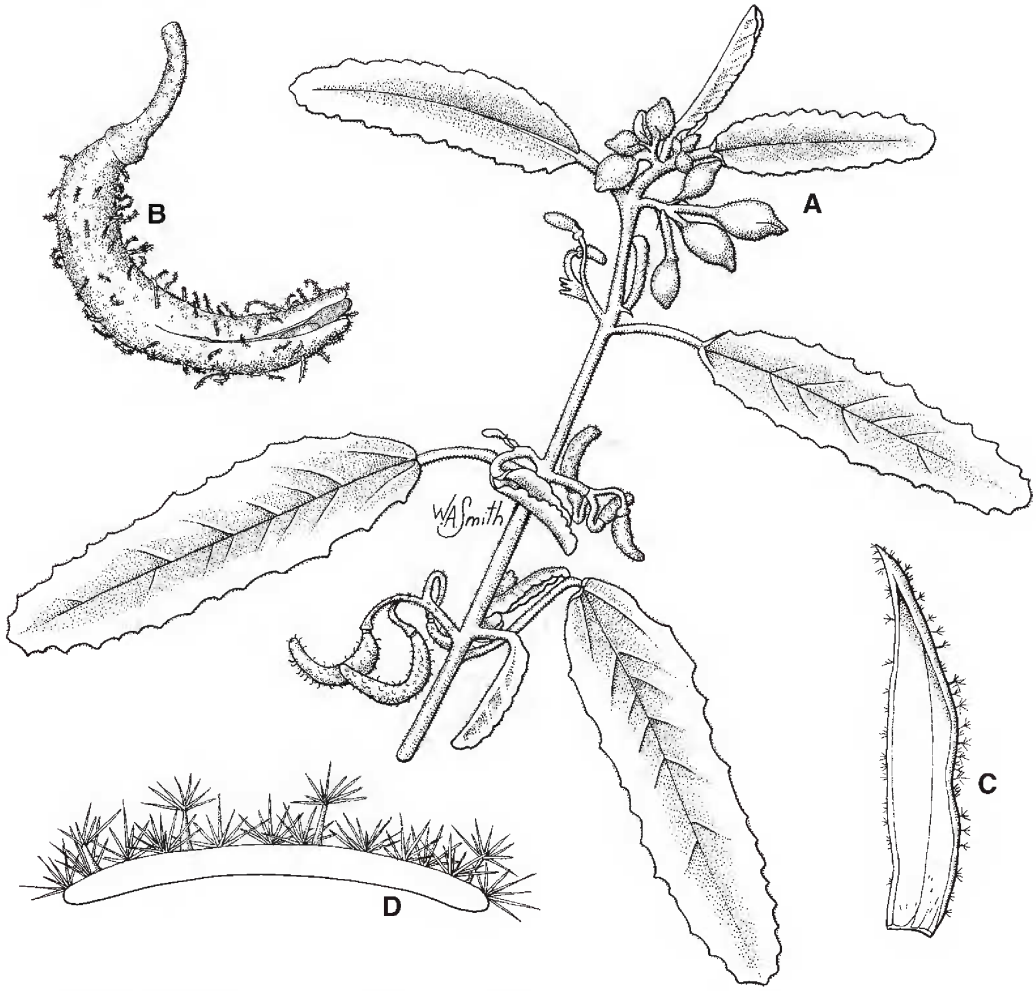

Fig. 3. ***Corchorus congener.*** A. branchlet with flower buds and fruit. × 1.5. B. fruit. × 3. C. ventral view of sepal. × 8. D. cross-section of sepal. × 36. A–D from *George* 6671 (PERTH). Del. W. Smith.

branchlets, leaves, stipules, peduncles, pedicels and bracts ferruginous or rarely grey-white, very dense, floccose, comprised of mostly dendritic-stellate and stellate hairs but simple hairs also present. Stellate hairs sessile or stipitate, up to 0.9 mm across; stipes red-brown or white, straight, up to 0.2 mm long; rays firm to pliable, ferruginous or white, up to 0.5 mm long. Dendritic-stellate hairs up to 4 mm long; stipes red-brown or pale yellow, tortuous; rays firm to pliable, white or ferruginous, up to 0.8 mm long. Simple hairs glandular, white, flexuous, up to 0.3 mm long. Leaves with petioles 10–25 mm long; stipules subulate-linear, 4–20 mm long; lamina ovate, (3–)4–9 cm long, 2–6 cm wide, l:w ratio 2–4:1, concolorous; base rounded; margin dentate-serrate; apex acute to rounded. Inflorescences umbellate, 4–15-flowered, leaf-opposed, solitary at upper nodes; peduncles 5–20 mm long; pedicels 2–12 mm long, spreading to erect in flower and fruit; bracts subulate-linear, 5–12 mm long. Flower buds ellipsoid, 6–10 mm across; apex obtuse occasionally with 5 spreading caudae to 1 mm long. Sepals 5, persistent, narrowly obovate-elliptic, 10–18 mm long, 2–4 mm wide; abaxial surface with a very dense indumentum of dendritic-stellate and stellate hairs, the largest hairs up to 2 mm long; adaxial surface stellate-villose proximally, glabrous distally; apex acute or caudate, up to 6 mm long. Petals 5; lamina obovate, 8–11 mm

long, 3–6 mm wide, glabrous; claw 1–1.5 mm long, stellate-villose on abaxial surface and margins. Androgynophore 0.5–0.7 mm long; annulus entire, c. 0.5 mm long, densely stellate-pubescent. Stamens 50–100; filaments 3–8 mm long; anthers c. 0.8 mm long. Ovary ovoid to cylindrical, densely stellate-tomentose, 3 to 7-locular, with 16–30 ovules in each locule; style c. 5 mm long. Fruits ovoid, 12–17 mm long, 10–12 mm across, 1–1.7 times longer than wide, circular in transverse section, 4 to 6-valved; apex rounded; indumentum dense, of dendritic-stellate and stellate hairs, the largest hairs c. 4 mm long. Seeds compressed obovoid, c. 2 mm long.

***Selected specimens (from 52 examined)*: Western Australia.** FORTESCUE DISTRICT: 7 km NW of Quarry Hill, c.130 km W of Tom Price, Jul 1984, *Newbey* 10586 (PERTH); 33 km SE of Mt Bruce, May 1980, *Houston* s.n. [PERTH1522892] (PERTH). CARNARVON DISTRICT: 120 km S of Onslow, May 1962 *Aplin* 1603 (MEL, PERTH); near Carnarvon, Jul 1965, *Ashby* 1563 (AD, CANB); 7 km N of Gascoyne Junction, Oct 1984, *Mitchell* 1312 (PERTH); 16 km N of Gascoyne Junction, Sep 1987, *Green* 5391 (PERTH); 166 km SSE of Carnarvon, on North West Coastal Highway, Aug 1965, *Beauglehole* ACB11795 (PERTH); Woodleigh Station, E of Perth–Carnarvon road, Sep 1959, *Burbidge* 6366 (PERTH); 30 miles [c. 48 km] E of Hamelin Pool, Aug 1931, *Gardner* 2542 (PERTH). ASHBURTON DISTRICT: Barlee Range, Henry R., Aug 1961, *Royce* 6599 (PERTH); 50 km NW of Cobra Homestead on Gascoyne Junction to Mt Augustus road near Lyons R., Jul 1986, *Conrick* 9851 (MEL); Mount Sandiman Station, Aug 1969, *Wilcox* 40 (PERTH); Mt Augustus, Aug 1970, *Ashby* 3372 (AD, MEL). AUSTIN DISTRICT: near Mount Gould, flumen Murchison, Aug 1963, *Gardner* 14529 (PERTH); 20.7 miles [c. 33 km] N of Belele, Jul 1958, *Speck* 945 (CANB); 12 miles [c. 19 km] SE of Berrugarra [Beringarra], Sep 1957, *Speck* 675A (CANB); 10 miles [c. 16 km] W of Mileura on Nookawarra road, Jul 1958, *Speck* 1006 (CANB, MEL); 10 miles [c. 16 km] S of Berrugarra [Beringarra], Jul 1958, *Speck* 976 (AD, CANB); 2.2 km ENE of Pepper Tree Bore, Koonanarra [Koonmarra] Station, Aug 1986, *Cranfield* 5927 (PERTH); Wiluna area, Dec 1970, *Morrissey* 51 (PERTH).

***Distribution and habitat*:** *Corchorus crozophorifolius* is confined to the north-west of Western Australia, from Exmouth southwards to Woodleigh Station (south of Carnarvon) and east to Wiluna (**Map 1**). It is recorded as growing in *Acacia* shrubland and woodland communities, on sandy soils on alluvial flats and along watercourses, and on skeletal soils derived from limestone or granite on rocky rises and hills.

***Phenology*:** Flowers have been collected from May to November, fruits from July to November.

***Typification*:** Baillon (1866) cited a collection from the Baudin expedition in the protologue of *Nettoa crozophorifolius*. I have seen two sheets of original material of *N. crozophorifolius* from the Baudin expedition on loan to BRI from P. The sheet with the hand written label "(Leschenault legit!) Tiliaceae, Nova Holland ile sterile" is selected as lectotype because it agrees with the original description and the fragment at the top left of the sheet matches the drawing with Baillon's original description.

***Notes*:** *Corchorus crozophorifolius* is a distinctive species with its floccose indumentum on the stems, petioles and inflorescences, and its densely hairy annulus. There are two indumentum colour forms. The typical and more widespread form has an indumentum of ferruginous hairs on the young shoots and buds. The other form has an indumentum of white hairs (eg. *Newbey* 10586 (PERTH), *Aplin* 1603 (MEL, PERTH) and *Ashby* 4143 (AD, PERTH)) and is found mostly in the northern part of the species range. The white form of *C. crozophorifolius* may be confused with *C. incanus* but is easily distinguished by having a densely hairy annulus.

The collections *Weber* 4928 (AD), *George* 1362 (PERTH), *McWhae* s.n. [PERTH1522825] and *George* 1343 (PERTH) from Cape Range near Learmonth resemble *C. crozophorifolius* in their indumentum and floral morphology but differ by having cylindrical fruits (15–20 mm × 4–5 mm) and a much finer serration on the leaf margin. This variant needs to be investigated further and may be worth recognising at least at a subspecific rank if not as a distinct species.

5. Corchorus elachocarpus F.Muell., Fragm. 8: 6 (1872). **Type:** [Western Australia.] Nichol Bay, *P. Walcott* (lecto: MEL [MEL223670], *fide* B. Rye, *Nuytsia* 9(3): 418 (1994)).

Shrub to 0.6 m high; stems sparingly to much branched, spreading; young shoots with grey-white or rarely ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of stellate

hairs. Stellate hairs sessile or sometimes stipitate, up to 0.6 mm across; stipes red-brown, straight, up to 0.1 mm long; rays pliable, white, up to 0.4 mm long. Leaves with petioles 4–13 mm long; stipules subulate-linear, 2–3 mm long; lamina narrowly oblong, 2–5 cm long, 0.4–1.3 cm wide, l:w ratio 2–5:1, concolorous; base rounded; margin serrulate; apex obtuse. Inflorescences umbellate, 3–7-flowered, leaf-opposed, solitary at upper nodes; peduncles 2–4 mm long; pedicels 1–2 mm long, spreading to erect in flower, spreading to recurved in fruit; bracts subulate-linear, 1–2 mm long. Flower buds globose, 2–3 mm across; apex obtuse with 5 erect caudae to 0.5 mm long. Sepals 5, not persistent, narrowly obovate-elliptic, 4–6 mm long, 1–2 mm wide; abaxial surface with a dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface glabrous or with a few scattered stellate hairs proximally; apex shortly caudate, up to 1 mm long. Petals 5; lamina obovate to broadly obovate, 3–5 mm long, 3–4 mm wide, glabrous; claw 0.5–0.7 mm long, sparsely stellate-pubescent. Androgynophore 0.5–0.8 mm long; annulus entire, c. 0.2 mm long, glabrous. Stamens 27–42; filaments 3–4 mm long; anthers c. 0.5 mm long. Ovary ovoid, 1–1.5 mm across, densely stellate-tomentose, 3(rarely 4)-locular, with 6–8 ovules in each locule; style 3–4 mm long. Fruits narrowly ellipsoid or narrowly ovoid, 4–10 mm long, 1–4 mm across, 2.5–4 times longer than wide, not conspicuously constricted between seeds, circular in transverse section, 3(rarely 4)-valved; apex rounded to obtuse; indumentum dense, of dendritic-stellate and stellate hairs, the largest hairs up to 3 mm long. Seeds obovoid, c. 2 mm long. Chromosome No. 2n = 14 (Islam & Qaiyum 1961).

***Selected specimens (from 13 examined)*: Western Australia.** FORTESCUE DISTRICT: 30–40 km S of Port Hedland, Jun 1982, *Glennon* 76 (PERTH); Warralong, Aug 1941, *Burbidge* s.n. [PERTH1532278] (PERTH); Muccan Station, De Grey R., Jun 1941, *Burbidge* 966 (PERTH); 4.5 km W of "Warrawagine" Homestead, c. 65 km SE of Shay Gap, Jul 1984, *Newbey* 10541 (CANB, PERTH); Main Shay Gap–Marble Bar road, c. 6 km by road SW of turnoff to Kittys Gap Well, Aug 1977, *Barker* 2084 (AD); 3 miles [c. 5 km] S of Stag Arrow Creek, May 1947, *Royce* 1703 (PERTH); 4 miles [c. 6 km] N of Stag Arrow Creek, May 1947, *Royce* 1715 (PERTH). CARNARVON DISTRICT. c. 15 km N of crossing from North West Coastal Highway towards Yanrey, Oct 1975, *Weber* 4890 (PERTH); Marilla Station complex, Oct 1984, *Stretch* s.n. [PERTH1532243] (PERTH); Carnarvon Geraldton road, Sep 1968, *Baird* s.n. [PERTH1532723] (PERTH).

***Distribution and habitat*:** *Corchorus elachocarpus* is confined to the Pilbara region of Western Australia from near Yanrey Station eastwards to Warrawagine Station and Stag Arrow Creek (**Map 6**). It is recorded as growing in hummock grassland and open shrubland communities, on sandy or sandy clay soils on flats.

***Phenology*:** Flowers have been collected from May to October, fruits in May, June, August and October.

***Notes*:** The collections *Mitchell* PRP1462 (BRI) and *Mitchell* PRP1135 (BRI) from Marrillana Station near Newman represent an undescribed entity closely related to *C. elachocarpus*. It differs from *C. elachocarpus* in having narrowly ovate leaves, longer peduncles and pedicels, and broader fruit. This entity warrants formal recognition. However, more material is required before this can be undertaken.

The collection *George* [PERTH1532251] (PERTH) from the Great Sandy Desert, is noted here because it is similar to *C. elachocarpus* but differs in having much larger leaves, fruits and flowers. Even from this single specimen, it is clear that the entity it represents warrants formal recognition. However, more material is required before this can be undertaken.

6. Corchorus elderi F.Muell., Trans. & Proc. Roy. Soc. South Australia 9: 58 (1887). **Type:** [Northern Territory.] N of Macdonell Range, 1886, *Lt Dittrich* (lecto, here chosen: MEL [MEL223672]; isolecto: AD [AD95836005], MEL [MEL223671]).

Shrub to 0.4 m high; stems much branched, spreading to erect. Indumentum on young shoots, branchlets, stipules, peduncles, pedicels and bracts ± white, sparse to moderately dense, comprised of stellate hairs. Stellate hairs sessile, up to 0.6 mm across; rays pliable, white, up to 0.4 mm long. Leaves with petioles 2–13 mm long; stipules subulate-linear, 1–3 mm long; lamina narrowly oblong-elliptic, 1–4 cm long, 0.5–1.5 cm wide, concolorous; adaxial surface glabrous or sparsely stellate hairy; abaxial surface moderately dense to densely stellate hairy; base obtuse to rounded; margin serrate or serrulate; apex obtuse. Inflorescences

umbellate, 2 or 3-flowered, lateral, solitary at nodes; peduncles 1–5 mm long; pedicels 2–7 mm long, spreading to erect in flower and fruit; bracts subulate-linear, 1–2 mm long. Flower buds broadly obovoid, 2–4 mm across; apex obtuse or shortly acuminate. Sepals 5, not persistent, narrowly obovate-elliptic, 6–7 mm long, 1–2 mm wide; abaxial surface with a moderately dense indumentum of stellate hairs up to 0.3 mm long; adaxial surface glabrous; apex acute or shortly caudate, up to 0.5 mm long. Petals 5; lamina obovate, 5–7 mm long, 2–4 mm wide, glabrous; claw c. 1 mm long, stellate-pubescent on margins. Androgynophore 0.2–0.5 mm long; annulus undulate, c. 0.2 mm long, glabrous. Stamens 40–60; filaments 3–4 mm long; anthers c. 0.5 mm long. Ovary ovoid, 1.5–2 mm across, densely stellate-tomentose, 5 or 6-locular, with c. 20 ovules in each locule; style 2–3 mm long. Fruits ellipsoid to broadly ellipsoid, 5–10 mm long, 4–8 mm across, 1.2–2.4 times longer than wide, not conspicuously constricted between seeds, circular in transverse section, 4 or 5-valved; apex rounded; indumentum dense, of stellate and dendritic-stellate hairs up to 1.5 mm long. Seeds compressed obovoid, 1–2 mm long.

***Selected specimens (from 12 examined)*: Northern Territory.** Central Northern Region: Trew Bore, Elkedra Station, Dec 1986, *Strong* 947 (DNA); 5 miles [c. 8 km] W of Tarlton Downs Homestead, Feb 1968, *Latz* 156 (AD, BRI, DNA, MEL, NSW); Plenty Highway, 72 km E of Arthur R., May 1988, *Thomson* 2433 (DNA). Central Southern Region: sandy flat on western side of Hay R., c. 14 km SSE of Mt Winnecke, Jul 1982, *Purdie* 2323 (CANB, DNA); Lake Caroline, Oct 1986, *Leach* 1039 (BRI). **Queensland.** Gregory North District: sandplain at mouth of Toko Gorge, Toko Range, Jul 1982, *Purdie* 2285 (BRI, CANB); levee adjacent to Burke R., 2 km S of Boulia, Sep 1978, *Purdie* 1328 (BRI).

***Distribution and habitat*:** *Corchorus elderi* is not a common species over its range from the Davenport Ranges, Northern Territory eastwards to Boulia, in western Queensland (**Map 1**). It is recorded as growing in low to tall open *Acacia* shrubland or open eucalypt woodland communities, on red sandy soils on flats or ridges.

***Phenology*:** Flowers have been collected in February, May, July and from September to December, fruits in May, July and from September to December.

***Typification*:** In the protologue of *Corchorus elderi*, Mueller (1887) cited a collection made by Lieut. Dittrich from a region north of the MacDonnell Ranges. Three sheets (two at MEL [MEL223671; MEL223672] and one sheet at AD [AD95836005]) of Dittrich's collection from this area have been located. The MEL sheet marked MEL223672 is here chosen as the lectotype as it is the better preserved of the three specimens seen.

7. Corchorus incanus Halford **sp. nov.** similis *C. walcottii* et *C. lanifloro*. Ab utroque pilis conspicuis simplicibus glandularibus deficientibus differt. Addite ab illo lobis calycis persistentibus in fructibus, pilis longioribus (3–5 non usque 1.5 mm longis) in fructibus et in pagina abaxiali sepalium differt. *Corchorus incanus* confunderi potest variantia albiflora *C. crozophorifolii* autem ab illo annulo glabro pubescente distinguendus. **Typus:** Western Australia. Fortescue District: Great Northern Highway–Shellborough track, c. 35 km NNW of Goldsworthy, 6 August 1977, *I.R. Telford* 6524 & *G. Butler* (holo: CANB; iso: BRI, PERTH, distribuendi).

Shrub to 1 m high, sometimes viscid; stems much branched. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of mostly stellate hairs but dendritic-stellate and simple hairs also occasionally present. Stellate hairs sessile or stipitate, up to 2 mm across; stipes red-brown to white, straight or tortuous, up to 0.8 mm long; rays soft, white, spreading, up to 1.5 mm long. Dendritic-stellate hairs up to 1.5 mm long; stipes red-brown, tortuous; rays soft, white, up to 0.8 mm long. Simple hairs glandular, white, flexuous, up to 0.5 mm long. Leaves with petioles 15–30 mm long; stipules subulate-linear, 8–20 mm long; lamina ovate to very broadly ovate, 3–8.5 cm long, 2–7 cm wide, l:w ratio 1.2–1.6:1, concolorous or slightly discolorous; base rounded or slightly cordate; margin serrate; apex rounded to obtuse. Inflorescences umbellate, 4–7-flowered, leaf-opposed, solitary at nodes; peduncles 7–25 mm long; pedicels 2–10 mm long, spreading to erect in flower and fruit; bracts filiform-linear; 8–25 mm

long. Flower buds broadly ellipsoid, 7–10 mm across; apex obtuse with 5 spreading caudae to 8 mm long. Sepals 5, persistent, narrowly elliptic, 8–16 mm long, 1–5 mm wide; abaxial surface with a dense indumentum of mostly dendritic-stellate hairs but stellate hairs also present, the largest hairs c. 3 mm long; adaxial surface stellate-villose proximally, glabrous distally; apex caudate, 3–6 mm long. Petals 5; lamina obovate, 6–9 mm long, 4–5 mm wide, glabrous; claw c. 1 mm long, with stellate-pubescent margins. Androgynophore 0.1–0.3 mm long; annulus entire, 0.2–0.4 mm long, glabrous or rarely with scattered hairs. Stamens 100–120; filaments 4–6 mm long; anthers c. 0.5 mm long. Ovary subglobose, 1–2 mm across, densely stellate-tomentose; 4 or 5-locular, with 10–24 ovules in each locule; style 2–6 mm long. Fruits subcylindrical or ovoid, 8–17 mm long, 5–10 mm across, 1.6–2.5 times longer than wide, not conspicuously constricted between seeds, ± circular in transverse section, 4 or 5-valved; apex obtuse; indumentum dense, of stellate and dendritic-stellate hairs, the largest hairs c. 5 mm long. Seeds compressed obovoid, 2–3 mm long.

***Affinities*:** *Corchorus incanus* resembles *C. walcottii* and *C. laniflorus* but differs from both by lacking conspicuous simple glandular hairs. In addition, *C. incanus* differs from *C. walcottii* by having persistent sepals and longer hairs on the fruits and the abaxial surface of the sepals (3–5 mm long compared with 1.5 mm long). *Corchorus incanus* may be confused with the white form of *C. crozophorifolius* but it can be distinguished from that by its more or less glabrous rather than densely hairy annulus. *Corchorus incanus* can be confused with *C. lasiocarpus* but differs from that by its relative shorter leaves and narrower fruits.

***Etymology*:** The specific epithet alludes to the overall greyish-white appearance of the whole plant; Latin *incanus* quite grey, hoary.

***Notes*:** This species occurs in the north-west of Western Australia, from Hamersley Range, near Wittenoom northwards to Port Hedland and Broome with an isolated record from the Rudall River on the south eastern edge of the Great Sandy Desert. Two subspecies are recognised here.

Indumentum on branchlet dense with stellate hairs mostly ≤ 1 mm across; plants generally growing on sandy soils on sandhills, plains and along watercourses ..... **7a. C. incanus** subsp. **incanus**

Indumentum on branchlets moderately dense with stellate hairs mostly 1–2 mm across; plants growing on stony soils along watercourses and in gorges ..... **7b. C. incanus** subsp. **lithophilus**

7a. Corchorus incanus Halford subsp. **incanus**

Shrub to 1 m high, sometimes viscid. Stellate hairs sessile or stipitate, up to 1.5 mm across; stipes straight or tortuous, up to 0.8 mm long; rays up to 1.5 mm long. Dendritic-stellate hairs up to 1.5 mm long; rays up to 0.8 mm long. Leaves with petioles 15–25 mm long; lamina broadly ovate to very broadly ovate, sometimes ovate, 3.5–8.5 cm long, 2.5–7 cm wide. Inflorescences 5–7-flowered; peduncles 7–25 mm long; pedicels 2–10 mm long; bracts 8–12 mm long. Sepals 12–16 mm long, 1–3 mm wide. Petals obovate, 6–9 mm long, 4–5 mm wide. Fruits subcylindrical or ovoid, 8–15 mm long, 5–10 mm across; dendritic-stellate hairs c. 5 mm long. **Fig. 4.**

***Selected specimens (from 23 examined)*: Western Australia.** DAMPIER DISTRICT: 1 mile [c. 1.6 km] N of Broome, May 1971, *Maconochie* 1174 (CANB, DNA, MEL, NSW, PERTH); 407 km from Port Hedland (P.O.) along Great Northern Highway towards Broome, Apr 1992, *Telford* 11587 (BRI); 7.5 km SW of the 80 Mile Beach turnoff, Sep 1986, *Chinnock* 6941 (AD); Nalgi Station, 80 Mile Beach, June 1941, *Burbidge* 1261 (PERTH); 2 km E of Nita Downs Homestead, Oct 1984, *Foulkes* 37 (PERTH); 86 km NE of Sandfire roadhouse, Great Northern Highway, Sep 1978, *Beauglehole* 59257 & *Erroy* 2957 (DNA); 124 miles [c. 200 km] SW of Anna Plains, SW of Broome, Aug 1965, *Beauglehole* ACB11326 (MEL, PERTH). FORTESCUE DISTRICT: Port Hedland, Feb 1983, *Rose* 2 (PERTH); Poondarrah Siding, Port Hedland–Marble Bar railway, May 1941, *Burbidge* 662 (PERTH); Finucane Island, Mar 1981, *Carr* B4 (PERTH); Shellborough track, c. 35 km NNW of Goldsworthy, Aug 1977, *Telford & Butler* 6524 (PERTH); Pier Creek, Warralong Station, May 1941, *Burbidge* 738 (PERTH); Warralong Station, between Shaw and Coongan

Fig. 4. ***Corchorus incanus*** subsp. ***incanus.*** A. branchlet with flowers and fruit. × 0.6. B. fruit. × 2. C. ventral view of sepal. × 4. A–C from *Telford* 6524 & *Butler* (BRI). Del. W. Smith.

Rivers, Jun 1941, *Burbidge* 1217 (PERTH). KEARTLAND DISTRICT: near Rudall R., May 1971, *George* 10780 (CANB, PERTH); Rudall R., Aug 1971, *Wilson* 10303 (PERTH).

***Distribution and habitat*:** *Corchorus incanus* subsp. *incanus* occurs from Port Hedland to Broome with an isolated record from Rudall River on the south-eastern edge of the Great Sandy Desert (**Map 7**). It is recorded as growing in low open shrubland or low open woodland communities, on sandy or rarely clayey sandy soils, on sandhills, plains or along watercourses.

***Phenology*:** Flowers have been collected in February and from April to September, fruits in June and from August and September.

7b. Corchorus incanus subsp. **lithophilus** Halford **subsp. nov.** a subspeciebus ceteris plantis plerumque viscidis, indumento pilorum stellatorum grossiorum differt. Crescit in solis saxosis circum flumina in tempus et saltus in comparatione in solis arenosis in clivis sabulosis et planitiis. *Corchorus incanus* subsp. *lithophilus* confunderi potest *C. incano* subsp. *lasiocarpo* foliis ovatis usque late ovatis non anguste ovatis usque ovatis marginibus grossiore serratis, fructibus minoribus (13–17 × 6–7 mm non 15–20 × 12–16 mm) distinguendus. **Typus:** Western Australia. FORTESCUE DISTRICT: Hamersley Range NP, Kalamina Gorge, below car park, 19 Aug 1977, *W.R. Barker* 1994 (holo: AD).

Corchorus lithophilus Halford ms, Paczkowska & Chapman (2000).

Corchorus saxicola Halford ms, Paczkowska & Chapman (2000).

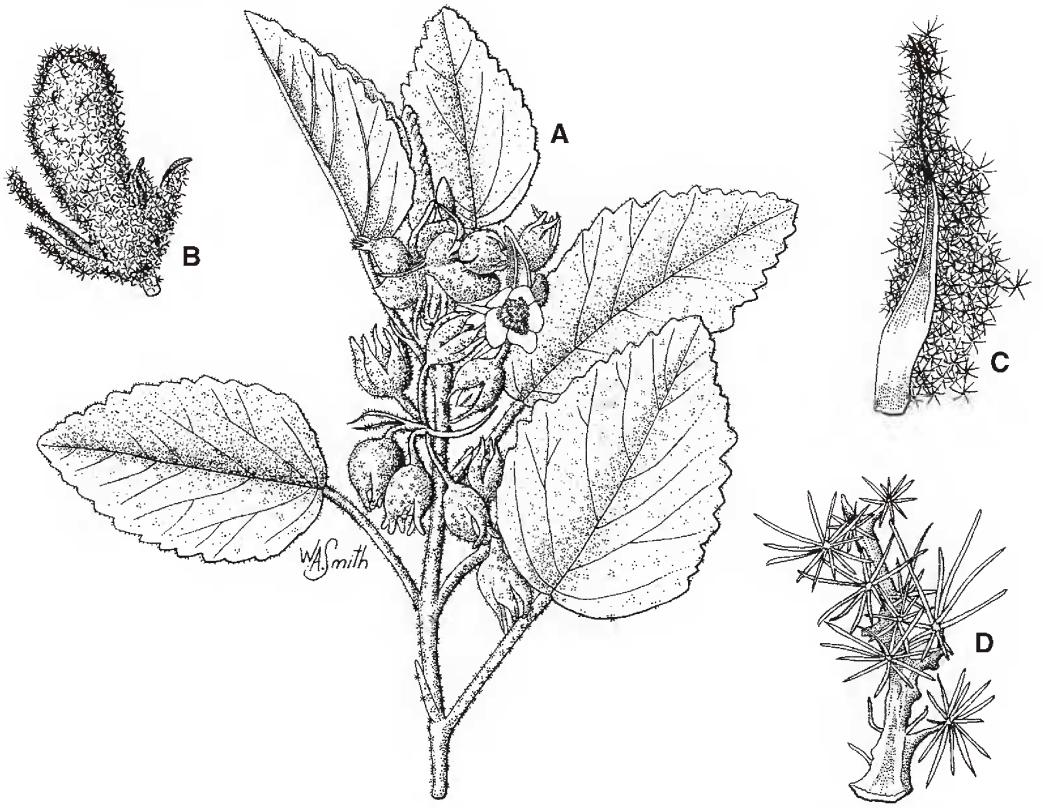

Fig. 5. ***Corchorus incanus*** subsp. ***lithophilus.*** A. branchlet with flower buds and flowers. × 0.6. B. fruit. × 2. C. ventral view of sepal. × 4. D. dendritic-stellate hair. × 24. A from *Craven* 7548 (CANB); B–D from *Barker* 1994 (AD). Del. W. Smith.

Shrub to 1 m high, usually conspicuously viscid. Stellate hairs sessile or stipitate, up to 2 mm across; stipes straight, up to 1 mm long; rays up to 2 mm long. Dendritic-stellate hairs up to 2 mm long; rays up to 1.5 mm long. Leaves with petioles 10–35 mm long; lamina ovate to broadly ovate, 3–8 cm long, 2–5.5 cm wide. Inflorescences 4–6-flowered; peduncles 8–10 mm long; pedicels 7–10 mm long; bracts 10–25 mm long. Sepals 8–16 mm long, 2–5 mm wide. Petals obovate to broadly obovate, 7–8 mm long, 5–7 mm wide. Fruits subcylindrical, 13–17 mm long, 6–7 mm across; dendritic-stellate hairs c. 3 mm long. **Fig. 5.**

***Additional specimens*: Western Australia.** Fortescue District: near racecourse, Wittenoom, Oct 1963, *Lullfitz* L2758 (PERTH); Wittenoom, Aug/Sep 1957, *Elliott* s.n. [PERTH1522574] (PERTH); near Wittenoom, Aug 1967, *Gittins* 1480 (NSW, PERTH); Hamersley Range, near Wittenoom Gorge, May 1958, *Burbidge* 6001 (PERTH), Wittenoom Gorge, Sep 1969, *Brooker* 2218a (PERTH); Hamersley Range NP, Fig Tree Soak, c. 10 km by road SW into Yampire Gorge from Wittenoom–Roy Hill road, Aug 1977, *Barker* 1966 (AD) c. 17 km E of Wittenoom on Roy Hill to Wittenoom road, Aug 1996, *Mitchell* PRP1463 (BRI); 15 km E of Wittenoom on the Roy Hill road, Sep 1982, *Craven* 7548 (CANB, MEL, PERTH).

***Distribution and habitat*:** *Corchorus incanus* subsp. *lithophilus* occurs in the Hamersley Range, near Wittenoom (**Map 6**). It is recorded as growing in hummock grassland communities on stony soils and along watercourses in low open woodland communities.

***Phenology*:** Flowers have been collected in May and from August to October, fruits in August.

***Affinities*:** *Corchorus incanus* subsp. *lithophilus* differs from the other subspecies by having a sparser indumentum of coarser stellate hairs and its plants are usually conspicuously

sticky. Its habitat differs also as it grows in stony soils around creeks and gorges rather than sandy soils on sandhills, plains or along watercourses. *Corchorus incanus* subsp. *lithophilus* may be confused with *C. lasiocarpus* subsp. *lasiocarpus* but can be distinguished from that by its ovate to broadly ovate rather than narrowly ovate to ovate leaves, coarser serrated leaf margins and smaller fruit (13–17 × 6–7 mm compared with 15–20 × 12–16 mm).

***Etymology*:** The subspecific epithet refers to the rocky habitat; Greek *lithos* stone, *philus* loving, fond.

8. Corchorus laniflorus Rye, Nuytsia 9(3): 416 (1994). **Type:** Western Australia. Fortescue District: Red Hill, 20 October 1941, *C.A. Gardner* 6348 (holo: PERTH *n.v.*; iso: CANB *n.v.*).

Compact shrub to 1(–1.2) m high; stems much branched, spreading. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, dense, woolly, comprised of mostly stellate and simple hairs but dendritic-stellate hairs also occasionally present. Stellate hairs sessile or stipitate, up to 2 mm across; stipes red-brown, tortuous, up to 0.7 mm long; rays soft, white, up to 2 mm long. Dendritic-stellate hairs up to 5 mm long; stipes up to 3 mm long; rays soft, white, 1–2.5 mm long. Simple hairs glandular, dull yellow to red-brown, flexuous, up to 1.5 mm long. Leaves with petioles 8–15(–30) mm long; stipules subulate-linear, 7–17 mm long; lamina ovate to very broadly ovate, 1.5–5 cm long, 1–4 cm wide, l:w ratio 1.1–1.7:1, concolorous or slightly discolorous; base rounded or slightly cordate; margin serrate or dentate-serrate; apex obtuse to rounded. Inflorescences umbellate, 5 or 6-flowered, leaf-opposed, solitary at nodes; peduncles 10–14 mm long; pedicels 5–9 mm long, spreading to erect in flower and fruit; bracts filiform-linear, 6–10 mm long. Flower buds globose, 5–12 mm across; apex obtuse with 5 spreading caudae to 4 mm long. Sepals 5, persistent, narrowly obovate-elliptic, 10–15 mm long, 2–3 mm wide; abaxial surface with a very dense indumentum of dendritic-stellate and simple hairs, the largest hairs up to 5 mm long; adaxial surface densely stellate hairy or ± glabrous; apex caudate, 4–6 mm long. Petals 5; lamina obovate to very broadly obovate, 6–10 mm long, 5–9 mm wide, glabrous; claw c. 1 mm long, stellate-pubescent on abaxial surface, with ciliate margins. Androgynophore 0.4–0.5 mm long; annulus undulate, up to 0.4 mm long, glabrous. Stamens 80–100; filaments 3–4 mm long; anthers c. 0.5 mm long. Ovary subglobose, c. 1.5 mm across, densely stellate-tomentose, 3 or 4(rarely 5)-locular, with 6–8 ovules in each locule; style 3–5 mm long. Fruits narrowly ellipsoid, 7–9 mm long, 3–4 mm across, 2.2–2.5 times longer than wide, not conspicuously constricted between seeds, circular in transverse section, 3 or 4(rarely 5)-valved; apex acute or rounded; indumentum dense, of mostly stellate and glandular hairs but dendritic-stellate hairs occasionally present, the largest hairs up to 0.8 mm long. Seeds obovoid, c. 2 mm long. **Fig. 6.**

***Selected specimens (from 19 examined)*: Western Australia.** Fortescue District: South Fortescue, Jul 1977, *Pfeiffer* 21 (PERTH); Red Hill Station, Aug 1970, *Beard* 6166 (PERTH); Python Pool, foot of Mt Herbert, Oct 1941, *Gardner* 6287 (PERTH); 16 km WNW of Mt York, Mar 1984, *Newbey* 10002 (PERTH); Nullagine road, S of Mt Edgar Station, Jun 1941, *Burbidge* 1183 (PERTH); Cranks Well on the North West Coastal Highway, Oct 1975, *Weber* 4873 (AD, PERTH); Nanutarra, Ashburton R., May 1905, *Morrison* s.n. [PERTH1525204] (PERTH); Uaroo Station, Jul 1964, *Beard* 3605 (PERTH); 44 km from Duck Creek along the Mt Stewart–Duck Creek track, Jun 1976, *Mitchell* 76/118 (PERTH); 3 mile [c. 5 km] N of Roy Hill, Aug 1963, *Beard* 2801 (PERTH). Ashburton District: 345 km N of Carnarvon, Jul 1976, *Stacey* 453 (PERTH); Towera Station, Aug 1981, *Cranfield* 1760 (PERTH); c. 15 km NW of Lyndon Homestead, Sep 1975, *Weber* (AD, BRI).

***Distribution and habitat*:** *Corchorus laniflorus* is confined to the Pilbara region, Western Australia, from Lyndon Station eastwards to Mt Edgar Station (**Map 4**). It is recorded as growing on sandy soils on spinifex plains and stony soils on hills or other rocky localities sometimes associated with sandstone.

***Phenology*:** Flowers have been collected in March and from June to October, fruits in June, September and October.

***Notes*:** *Corchorus laniflorus*, *C. parviflorus* and *C. walcottii* all have conspicuous simple glandular hairs present amongst the dense stellate indumentum on the stems, leaves and inflorescences. *Corchorus laniflorus* is most closely related to *C. parviflorus* but differs from that by having generally larger flowers and

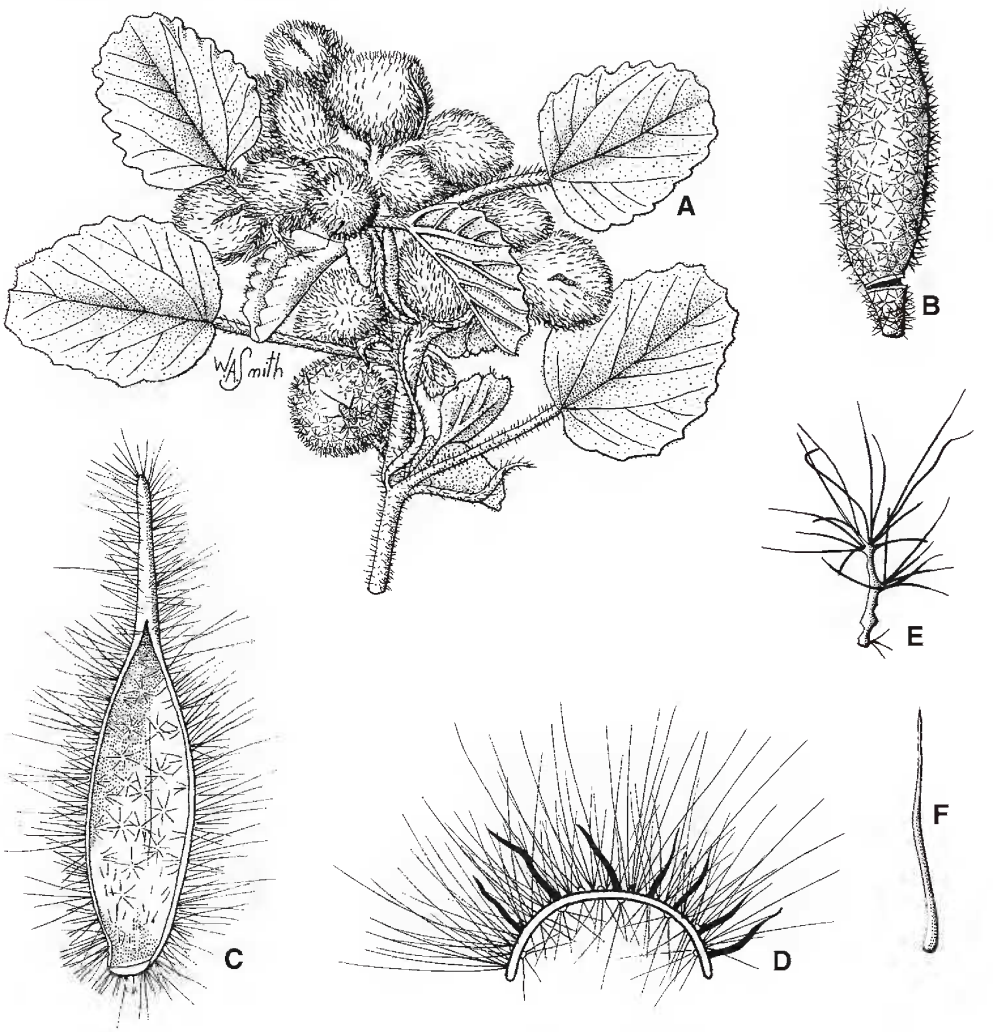

Fig. 6. ***Corchorus laniflorus.*** A. branchlet with flower buds and fruit. × 1. B. fruit with persistent sepals removed. × 3. C. ventral view of sepal. × 6. D. cross-section of sepal. × 12. E. dendritic-stellate hair. × 24. F. simple glandular hair. × 24. A from *Weber* 4873 (AD); B–F from *Gardner* 6287 (PERTH). Del. W. Smith.

fruits, and a thicker and denser indumentum. *Corchorus laniflorus* is distinguishable from *C. walcottii* by having a thicker indumentum on the stems and leaves, persistent sepals that enclose the fruit and shorter hairs on the fruit. *Corchorus laniflorus* resembles *C. sericeus* in having persistent sepals that enclose the fruit, but differs from that in having conspicuous simple glandular hairs, larger flowers and fruits and a thicker and softer indumentum on most parts.

The collections, *Forest* [MEL227128], *Burbidge* 5881 (PERTH), *Burbidge* 5961 (PERTH) and *Mitchell* PRP275 (BRI) from Abydos and Woodstock Stations south of Port Hedland, resemble *C. laniflorus* but differ from the typical form of this species by their smaller flowers, lack of conspicuous simple glandular hairs and narrowly ovate to ovate leaves. These specimens are somewhat similar to *C. sericeus* subsp. *densiflorus* from north-eastern Northern Territory. However, they differ from *C. sericeus* subsp. *densiflorus* in having a denser indumentum and larger flowers. These collections may represent a distinct species but further collections and study are required.

9. Corchorus lasiocarpus Halford **sp. nov.** similis *C. walcottii* et *C. lanifloro* autem ab utroque pilis conspicuis simplicibus glandularibus deficientibus differt et ab illo sepalis angustioribus (1–3 mm latis non 3–5 mm latis) persistentibus in fructibus, pilis longioribus (3 mm longis non 1.5 mm longis) in fructibus et in pagina abaxiali sepalarum et ab hoc fructibus majoribus (8–20 × 5–16 mm non 7–9 × 3–4 mm) differt. **Typus:** Western Australia. Fortescue District: Hamersley Range near Wittenoom Gorge, 7 May 1958, *N.T. Burbidge* 6005 (holo: PERTH; iso CANB).

Compact to open shrub to 1 m high, sometimes viscid; stems much branched, spreading. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of mostly stellate hairs but dendritic-stellate and simple hairs also occasionally present. Stellate hairs sessile or stipitate, up to 2 mm across; stipes red-brown or white, straight or tortuous, up to 0.8 mm long; rays firm to pliable, white, spreading, up to 2 mm long. Dendritic-stellate hairs up to 2.4 mm long; rays firm to pliable, up to 1.5 mm long. Simple hairs glandular, white, flexuous, up to 0.5 mm long. Leaves with petioles 7–25 mm long; stipules subulate-linear; 2–10 mm long; lamina narrowly ovate to ovate or narrowly oblong to oblong, 2–6 cm long, 0.4–3 cm wide, l:w ratio 1.8–3.5:1, concolorous; base rounded; margin serrate to dentate-serrate; apex obtuse to rounded. Inflorescences umbellate, 3–6-flowered, leaf-opposed, solitary at nodes; peduncles 4–25 mm long; pedicels 4–10 mm long, spreading to erect in flower and fruit; bracts filiform-linear, 5–15 mm long. Flower buds ellipsoid, 5–10 mm across; apex obtuse with 5 spreading caudae to 5 mm long. Sepals 5, persistent, narrowly obovate-elliptic, 9–15 mm long, 1–3 mm wide; abaxial surface with a dense indumentum of stellate and dendritic-stellate hairs, the largest hairs up to 3 mm long; adaxial surface stellate-villose proximally, glabrous distally; apex caudate, up to 6 mm long. Petals 5; lamina obovate to broadly obovate, 6–10 mm long, 5–8 mm wide, glabrous; claw 0.7–1 mm long, with ciliate margins. Androgynophore 0.1–0.3 mm long; annulus entire or sometimes sinuate, 0.2–0.4 mm long, glabrous. Stamens 95–140; filaments 4–6 mm long; anthers c. 0.5 mm long. Ovary subglobose or ellipsoid, 1.6–3 mm across, densely stellate-tomentose, 4 or 5(rarely 3)-locular, with 10–24 ovules in each locule; style 3–6 mm long. Fruits narrowly ellipsoid to broadly ovoid-ellipsoid, 8–20 mm long, 5–16 mm across, 1.2–2.5 times longer than wide, not conspicuously constricted between seeds, ± circular in transverse section, 4 or 5(rarely 3)-valved; apex acute to rounded; indumentum dense, of stellate and dendritic-stellate hairs up to 5 mm long. Seeds obovoid, c. 2 mm long.

***Affinities*:** *Corchorus lasiocarpus* resembles *C. walcottii* and *C. laniflorus* but differs from both by lacking conspicuous simple glandular hairs. In addition, *C. lasiocarpus* differs from *C. walcottii* by having narrower sepals (1–3 mm across compared with 3–5 mm across) that are persistent and longer hairs on the abaxial surface of the sepals (3 mm long compared with 1.5 mm long). *Corchorus lasiocarpus* differs from *C. laniflorus* by having larger fruit (8–20 × 5–16 mm compared with 7–9 × 3–4 mm).

Corchorus lasiocarpus can be confused with *C. incanus*. For differences from *C. incanus* refer to 'Affinities' section under that species.

***Etymology*:** The specific epithet refers to the woolly appearance of this species fruit; Greek *lasios*, hairy, woolly and *karpos* fruit.

***Notes*:** *Corchorus lasiocarpus* is confined to the north-west of Western Australia. The species as circumscribed here exhibits variation in numerous characters including leaf and fruit size, and the length of dendritic-stellate hairs. Two subspecies are formally recognised here.

Fruits 15–20 mm long; dendritic-stellate hairs on fruit up to 5 mm long
..... **9a. C. lasiocarpus** subsp. **lasiocarpus**
Fruits 8–12 mm long; dendritic-stellate hairs on fruit up to 2 mm long
..... **9b. C. lasiocarpus** subsp. **parvus**

Fig. 7. ***Corchorus lasiocarpus*** subsp. ***lasiocarpus.*** A. branchlet with fruit. × 1. B. fruit. × 2. C. ventral view of sepal. × 4. A–C from *Royce* 1707 (PERTH). Del. W. Smith.

9a. Corchorus lasiocarpus Halford subsp. lasiocarpus

Spreading shrub to 1 m high. Petioles 10–25 mm long. Leaf lamina narrowly ovate to ovate, 3.5–6 cm long, 1.5–3 cm wide, l:w ratio 1.8–2:1. Inflorescences 3–6-flowered; peduncles 8–25 mm long; pedicels 5–10 mm long. Flower buds 7–10 mm across. Sepals 12–15 mm long, 2–3 mm wide; apex caudate, up to 6 mm long. Petals obovate to broadly obovate, 8–10 mm long, 6–8 mm wide. Stamens 130–140; filaments 5–6 mm long. Ovary subglobose, 2–3 mm across, style 5–6 mm long. Fruits narrowly to broadly ovoid-ellipsoid, 15–20 mm long, 12–16 mm across; dendritic-stellate hairs up to 5 mm long. **Fig. 7.**

***Selected specimens (from 20 examined)*: Western Australia.** FORTESCUE DISTRICT: between Woodstock Station and Hamersley Range (Tablelands), May 1958, *Burbidge* 5989 (PERTH); 116 miles [c. 187 km] S of Port Hedland, on Wittenoom road, Aug 1960, *George* 1091 (PERTH); 4 km SW of Two Sisters, c. 145 km SE of Shay Gap, Jul 1984, *Newbey* 10528 (PERTH); 18 km SSW of Two Sisters, c. 160 km SE of Shay Gap, Jul 1984, *Newbey* 10477 (PERTH); 142 miles [c. 228 km] S of Port Hedland, on Wittenoom road, Aug 1960, *George* 1073 (PERTH); 11 miles [c. 18 km] E of Wittenoom, Aug 1960, *George* 1008 (PERTH); Yampire Gorge, Hamersley Range, Aug 1959, *Gardner* 12274 (PERTH); Dale Gorge, Hamersley Range, Aug 1960, *George* 1046 (PERTH); Stag Arrow Creek, Little Sandy Desert, Apr 1979, *Mitchell* 451 (DNA, PERTH); 1 mile [c. 1.6 km] N of Stag Arrow Creek, May 1947, *Royce* 1707 (PERTH); 20 miles [c. 32 km] N [of] Christmas Creek on R.P.F., May 1947, *Royce* 1772 (PERTH); off main road from Paraburdoo to Tom Price, 1 km along pipeline access track, Paraburdoo, Sep 1984, *Wurm* 1496 (PERTH). KEARTLAND DISTRICT: Little Sandy Desert, Apr 1979, *Mitchell* 687 (DNA, PERTH).

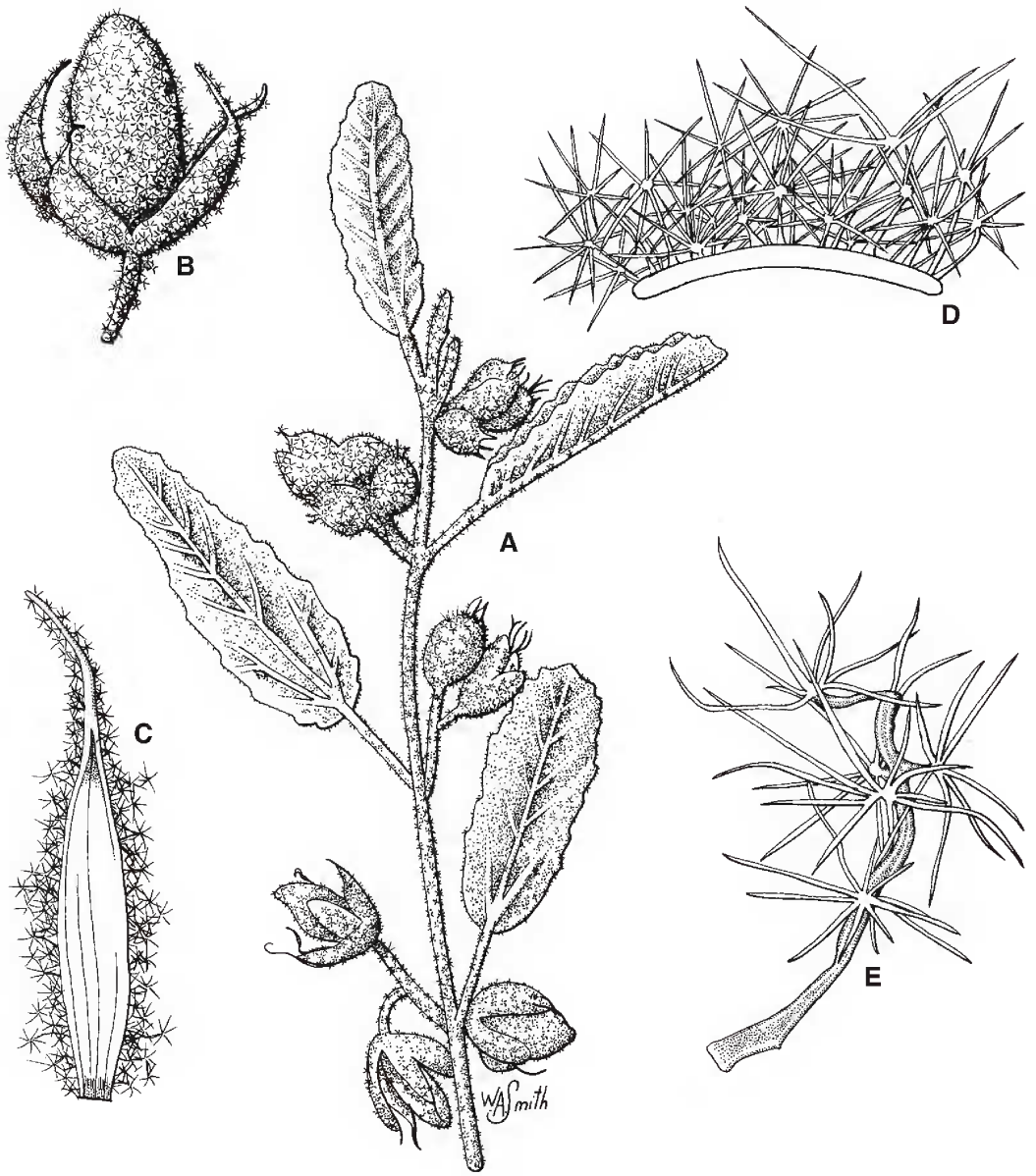

Fig. 8. ***Corchorus lasiocarpus*** subsp. ***parvus.*** A. branchlet with flower buds and fruit. × 1.5. B. fruit. × 3. C. ventral view of sepal. × 6. D. cross-section of sepal. × 24. E. dendritic-stellate hair. × 36. A–E from *Gardner* 6390 (PERTH). Del. W. Smith.

Distribution and habitat: *Corchorus lasiocarpus* subsp. *lasiocarpus* occurs from Tom Price eastwards to the Two Sisters on the western edge of the Great Sandy Desert (**Map 8**). It is recorded as growing in hummock grassland and open shrubland communities, on sandy, stony or gravelly soils along watercourses.

***Phenology*:** Flowers have been collected in April, May, December and from July to September, fruits in April, May, August and December.

9b. Corchorus lasiocarpus subsp. **parvus** Halford **subsp. nov.** a *C. lasiocarpo* subsp. *lasiocarpo* fructibus minoribus (8–12

× 5–7 mm non 15–20 × 12–16 mm), foliis minoribus (2–5.5 × 0.4–2.5 cm non 3.5–6 × 1.5–3 cm) pilis stellato-dendriticis minoribus (usque 2 mm longis non usque 5 mm longis) vestitis distinguendus. **Typus:** Western Australia. FORTESCUE DISTRICT: Yathalla Well, near Mt Rica, Hamersley Range, 22 Oct 1941, *C.A. Gardner* 6390 (holo: PERTH).

Open to compact shrub to 0.8 m high. Petioles 7–15 mm long. Leaf lamina narrowly ovate or narrowly oblong to oblong, 2–5.5 cm long, 0.4–2.5 cm wide, l:w ratio 2.1–3.5:1. Inflorescences 3 or 4-flowered; peduncles 4–17 mm long; pedicels 4–7 mm long. Flower buds 5–8 mm across. Sepals 9–12 mm long, 1–3 mm wide; apex caudate, up to 3 mm long. Petals obovate, 6–8 mm long, 5–6 mm wide. Stamens c. 95; filaments 4–5 mm long. Ovary ellipsoid, 1.6–2 mm across; style 3–5 mm long. Fruits narrowly ellipsoid, 8–12 mm long, 5–7 mm across; dendritic-stellate hairs up to 2 mm long. **Fig. 8.**

***Selected specimens (from 14 examined)*: Western Australia.** FORTESCUE DISTRICT: near Robe R., Aug 1970, *Beard* 6144 (PERTH); Hamersley Range–Bulgeeda to Pyrton, Aug 1963, *Cole* WA5040 (PERTH); Hamersley Range, Aug 1963, *Cole* WA5094 (PERTH); flats E of East Prongs, Tom Price, Jul 1980, [*Atkins*] HI-707 (PERTH); 6 miles [c. 10 km] E of Mt Brockman, Aug 1970, *Demarz* 2467 (PERTH); Marandoo, Mar 1980, *Atkins* HI-659 (PERTH); 0.5 km E of Packsaddle, Feb 1987, *Mollemans* 2279 (AD, PERTH); 2 km W of the Governor on the Packsaddle–West Angeles road, 23 km from P.S., Feb 1987, *Mollemans* 2216 (AD, PERTH).

***Distribution and habitat*:** *Corchorus lasiocarpus* subsp. *parvus* is confined to the Hamersley Range from near Mt Rica south-east to Mt Bruce (**Map 9**). It is recorded as growing in hummock grassland and tree steppe communities, on stony slopes and plains.

***Phenology*:** Flowers have been collected in February, March and from July to October, fruits in March.

***Affinities*:** *Corchorus lasiocarpus* subsp. *parvus* can be distinguished from *C. lasiocarpus* subsp. *lasiocarpus* by its smaller fruit (8–12 × 5–7 mm compared with 15–20 × 12–16 mm), smaller leaves (2–5.5 × 0.4–2.5 cm compared with 3.5–6 × 1.5–3 cm) and shorter dendritic-stellate hairs on the fruit (up to 2 mm long compared with up to 5 mm long).

***Etymology*:** The specific epithet is in reference to the overall smaller dimensions of this subspecies; Latin *parvus* little.

10. Corchorus leptocarpus A.Cunn. ex Benth., Fl. Austral. 1: 278 (1863). **Type:** [Western Australia.] Water Island, NW coast, [Sep 1820,] *A. Cunningham* [No. 247] (holo: K; iso: MEL [MEL227288], CANB).

Shrub to 2 m high; stems sparingly to much branched, erect; young shoots with ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.4 mm across; stipes red-brown, straight, up to 0.2 mm long; rays firm, white or sometimes ferruginous, up to 0.2 mm long. Leaves with petioles 8–13 mm long; stipules narrowly triangular to subulate-linear, 3–5 mm long; lamina narrowly ovate to ovate, 6–10 cm long, 2–4 cm wide, l:w ratio 2.5–3:1, discolorous; base rounded or slightly cordate; margin serrulate or crenate; apex obtuse or rarely acute. Inflorescences umbellate, 3–6-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 1–4 mm long; pedicels 5–7 mm long, spreading to erect in flower, recurved to erect in fruit; bracts subulate-linear, 2–3 mm long. Flower buds obovoid-ellipsoid, 4–5 mm across, longitudinally ridged; apex obtuse with 5 erect to spreading caudae to 2 mm long. Sepals 5, not persistent, narrowly obovate, 12–14 mm long, c. 3 mm wide; abaxial surface with a dense indumentum of stellate hairs up to 0.2 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex acuminate-caudate, up to 2 mm long. Petals 5; lamina obovate to broadly obovate, 8–10 mm long, c. 7 mm wide, glabrous; claw c. 1 mm long, stellate-pubescent on margins. Androgynophore c. 0.4 mm long; annulus entire, c. 0.4 mm long, glabrous. Stamens 80–90; filaments 7–9 mm long; anthers c. 0.5 mm long. Ovary cylindrical, c. 0.9 mm across, densely stellate-puberulous, 3(rarely 4)-locular, with 44–48 ovules in each locule; style 6–7 mm long. Fruits subcylindrical, 20–60 mm long, 2–3 mm across, 7–20 times longer than wide, ± straight to slightly curved or if on recurved pedicels then fruit abruptly bent near base so that the fruit is perpendicular with the apex

pointing upwards, slightly to markedly constricted between seeds, circular in transverse section, 3(rarely 4)-valved; apex attenuate, 2–4 mm long; indumentum moderately dense to dense, of stellate hairs; stellate hairs up to 0.5 mm long, 0.4 mm across. Seeds compressed obovoid, c. 2 mm long.

***Additional specimens*: Western Australia.** GARDNER DISTRICT: 6 km SW of Crystal Head, Port Warrender, Admiralty Gulf, Jan 1982, *Farrell* 979 (PERTH); Boomerang Bay on W side of Bigge Island, Bonaparte Archipelago, May 1987, *Kenneally* 10018 (BRI, PERTH); E side of Mindjau Creek, Port Warrender, Admiralty Gulf, Jan 1982, *Kenneally* 7771 (PERTH); Hunter R., West Kimberley, May 1987, *Kenneally* 9946 (PERTH); Pim Hill, SE of West Bay, May 1984, *Willis* s.n. [MEL1599281] (MEL); Osborne Island (south east island), Bonaparte Archipelago, Jun 1973, *Wilson* 11095 (PERTH).

***Distribution and habitat*:** *Corchorus leptocarpus* occurs on the islands and in coastal areas of the Kimberley, Western Australia, from Bigge Island, Bonaparte Archipelago eastwards to West Bay (**Map 6**). It is recorded as growing on soils derived from sandstone, along drainage lines and in shallow depressions in flat country.

***Phenology*:** Flowers have been collected in May, fruits in May and June.

***Notes*:** *Corchorus leptocarpus* is similar to *C. sidoides* in that it has narrow cylindrical fruits that are slightly to markedly constricted between the seeds. However, *C. leptocarpus* differs from *C. sidoides* by having larger flowers (sepals 12–14 mm long compared with 3–9 mm long; petals c. 10 × 7 mm compared with 2–7 × 0.5–4 mm), larger leaves (6–10 × 2–4 cm compared with 0.6–9 × 0.2–3 cm), and erect rather than spreading to pendulous fruit. *Corchorus leptocarpus* is most closely related to *C. sublatus* and *C. subargentus*. For features distinguishing *C. leptocarpus* from *C. sublatus* and *C. subargentus* see 'Affinities' under those species.

11. Corchorus mitchellensis Halford, **sp. nov.** affinis *C. leptocarpo* autem floribus minoribus (sepalis 6–7 × c. 2 mm et petalis 6 × 3 mm non sepalis 12–14 mm × c. 3 mm et petalis 8–10 x. c. 7 mm), pilis stellatis majoribus (usque 1.3 mm diam. non usque 0.4 mm diam.) in fructibus differt. **Typus:** Western Australia. GARDNER DISTRICT: Mitchell Falls, Mitchell Plateau, 30 May 1992, *D. Halford* Q1433 (holo; PERTH; iso: BRI, DNA, MEL, distribuendi).

Shrub to 1 m high; stems sparingly to much branched, erect; young shoots with ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white or ferruginous, moderately dense to dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 1.5 mm across; stipes white, straight, c. 0.1 mm long; rays firm, white or ferruginous, up to 0.7 mm long. Leaves with petioles 6–10 mm long; stipules subulate-linear, 1–2 mm long; lamina narrowly ovate to ovate, 3.5–8 cm long, 1–2.5 cm wide, l:w ratio 3.1–3.5:1, discolorous; base rounded; margin serrate to serrulate; apex obtuse to acute. Inflorescences umbellate 3–6-flowered, leaf-opposed, solitary at upper nodes; peduncles 1–2 mm long; pedicels 1–2 mm long, spreading to erect in flower, recurved in fruit; bracts subulate-linear, 1–2 mm long. Flower buds obovoid-ellipsoid, 3–4 mm across; apex obtuse with 5 erect caudae to 0.7 mm long. Sepals 5, not persistent, narrowly obovate, 6–7 mm long, c. 2 mm wide; abaxial surface with a moderately dense to dense indumentum of stellate hairs up to 0.7 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex acuminate-caudate, up to 1 mm long. Petals 5; lamina obovate, c. 6 mm long, c. 3 mm wide, glabrous; claw c. 0.8 mm long, stellate-pubescent on margins. Androgynophore c. 0.4 mm long; annulus entire, c. 0.4 mm long, glabrous. Stamens 60–70; filaments 3–4 mm long; anthers c. 0.5 mm long. Ovary cylindrical, c. 0.8 mm across, densely stellate-tomentose, 3-locular, with 20–24 ovules in each locule; style c. 4 mm long. Fruits subcylindrical, 20–40 mm long, 3–4 mm across, 7–10 times longer than wide, curved, circular in transverse section, slightly constricted between seeds, 3-valved; apex acute to obtuse, orientated upward; indumentum dense, of stellate hairs; stellate hairs up to 1 mm long, 1.3 mm across. Seeds compressed obovoid or columnar, 1–3 mm long. **Fig. 9.**

***Additional specimens*: Western Australia.** GARDNER DISTRICT: Mitchell Falls, Feb 1980, *Done* 120 (DNA); Mitchell Falls, Mitchell Plateau, May 1992, *Halford* Q1433a (BRI).

Fig. 9. ***Corchorus mitchellensis.*** A. branchlet with flower buds. × 1.5. B. fruit. × 2. C. ventral view of sepal. × 8. A from *Done* 120 (DNA); B, C from *Halford* Q1443 (BRI). Del. W. Smith.

***Distribution and habitat*:** *Corchorus mitchellensis* is known only from sandstone country around Mitchell Falls, Mitchell Plateau, Kimberley, Western Australia (**Map 4**). It is recorded as growing in shrubland and low open woodland communities on sandy or gravelly soils along drainage lines in dissected sandstone hills.

***Phenology*:** Flowers have been collected in February, fruits in May.

***Affinities*:** *Corchorus mitchellensis* is related to *C. leptocarpus* but differs from that by having smaller flowers (sepals 6–7 × c. 2 mm, petals c. 6 × 3 mm compared with sepals 12–14 × c. 3 mm, petals 8–10 × c. 7 mm) and larger stellate hairs on the fruit (hairs up to 1.3 mm across compared with 0.4 mm for *C. leptocarpus*).

***Etymology*:** The specific epithet is derived from the name Mitchell, plus the suffix *-ensis* indicating place of origin, alluding to the Mitchell Plateau from where this species is known.

12. Corchorus obclavatus Halford, **sp. nov.** quoad collocationem et formam et magnitudinem fructuum *C. pumilionis* autem statura altiore et forma

magnitudineque foliis differt (vide tabulam 2 pro differentiis). *Corchorus obclavatus* quoad habitus *C. sidoidi* subsp. *rostrisepalo* et *C. sublato* similis autem ab utroque fructibus brevioribus (4–9 mm longis nec 20–55 mm longis in *C. sidoide* subsp. *rostrisepalo* nec 20–50 mm in *C. sublato*), obclavatis non ± cylindricis differt. Addite *C. obclavatus* a *C. sublato* fructibus pendulis non erectis differt. **Typus:** Northern Territory. Darwin and Gulf Region: Jim Jim Falls, Kakadu NP, 20 April 1992, *D. Halford* Q1150 (holo: DNA; iso: BRI, MEL, distribuendi).

Shrub to 2 m high; stems sparingly to much branched, erect; young shoots with ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts, grey-white, dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.7 mm across; stipes red-brown, straight, up to 0.2 mm long; rays pliable, white or ferruginous, up to 0.5 mm long. Leaves with petioles 4–15 mm long; stipules subulate-linear, 2–5 mm long; lamina narrowly ovate, 3–9 cm long, 0.7–2 cm wide, l:w ratio 3.6–6:1, discolorous; base rounded or slightly cordate; margin serrulate to crenulate; apex acute or obtuse. Inflorescences umbellate, 4–7-flowered, leaf-opposed, solitary at upper nodes; peduncles 1–2 mm long; pedicels 1–2 mm long, erect to spreading in flower, recurved in fruit; bracts subulate-linear to filiform, 2–3 mm long. Flower buds obovoid-ellipsoid, 2–3 mm across; apex obtuse with 4 spreading caudae to 0.7 mm long. Sepals 4, not persistent, narrowly obovate, 4–6 mm long, 1–2 mm wide; abaxial surface with a dense indumentum of stellate hairs up to 0.3 mm long; adaxial surface glabrous; apex acuminate, up to 0.7 mm long. Petals 4; lamina narrowly obovate, 4–5 mm long, 2–3 mm wide, glabrous; claw c. 0.5 mm long, stellate-pubescent on margins. Androgynophore 0.2–0.3 mm long; annulus entire, c. 0.2 mm long, glabrous. Stamens 20–35; filaments 2–3 mm long; anthers c. 0.4 mm long. Ovary ovoid, 0.5–0.6 mm across, densely stellate-tomentose, 2-locular, with 2–4 ovules in each locule; style c. 3 mm long. Fruits obclavate, 4–9 mm long, 1–2 mm across, 2–5 times longer than wide, pendulous, straight, circular in transverse section, slightly constricted between seeds, 2-valved; apex attenuate, 1–4 mm long; indumentum moderately dense to dense, of stellate hairs up to 0.5 mm long. Seeds compressed obovoid or columnar, 1–2 mm long. **Fig. 10.**

***Aditonal specimens*: Northern Territory.** Darwin and Gulf Region: 12 km E of Mudginberri Homestead, Kakadu NP, Jan 1991, *Russell-Smith* 8409 & *Brock* (BRI); Jim Jim Falls, Kakadu NP, Apr 1992, *Halford* Q1151 (BRI).

***Distribution and habitat*:** *Corchorus obclavatus* is restricted to the sandstone taluses and escarpments of Kakadu National Park, Northern Territory (**Map 1**). It is recorded as growing on sandy soils in open woodland communities near vine thicket margins.

***Phenology*:** Flowers have been collected in January and April, fruits in April.

***Affinities*:** *Corchorus obclavatus* is similar in fruit orientation, shape and size to *C. pumilio* but differs from that by its taller stature, and leaf shape and size. These differences are summarized in **Table 1**. *Corchorus obclavatus* is similar in habit to *C. sidoides* subsp. *rostrisepalus* and *C. sublatus* but can be distinguished from these by having shorter fruit (4–9 mm long compared with 20–55 mm long for *C. sidoides* subsp. *rostrisepalus* and 20–55 mm long for *C. sublatus*) which are obclavate

Table 1. Morphological comparison of *Corchorus obclavatus* and *C. pumilio*.

Character	*C. obclavatus*	*C. pumilio*
habit	erect shrub to 2 m high	spreading shrub to 0.4 m high
leaf shape	narrowly ovate	oblong, oblong-elliptic or narrowly elliptic
leaf size (cm)	3–9 × 0.7–2	0.6–3.5 × 0.4–1.4

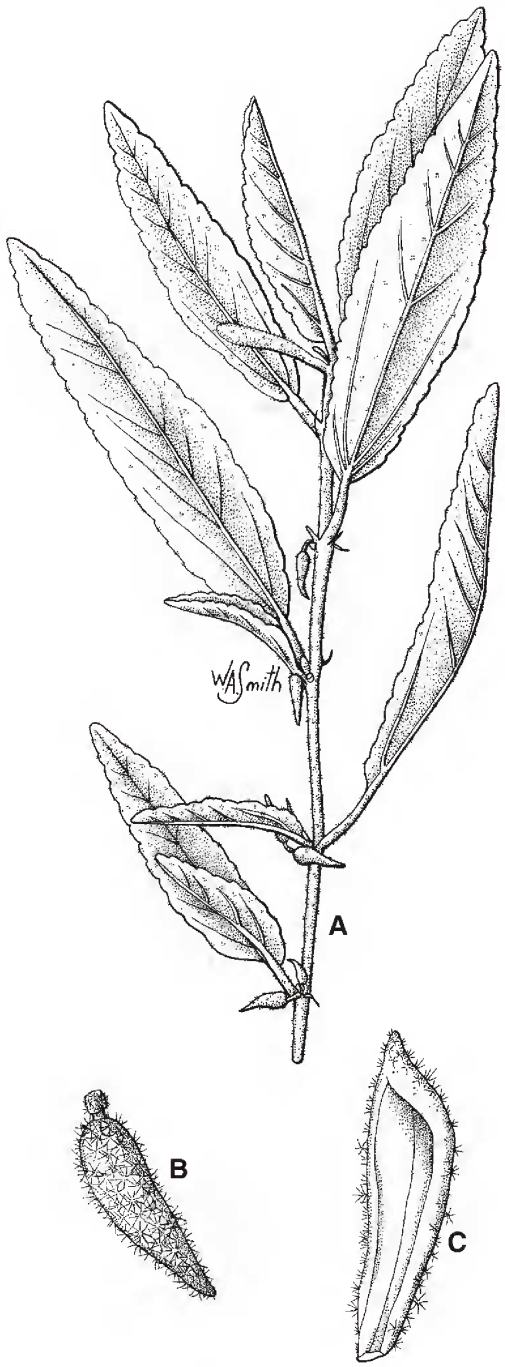

Fig. 10. ***Corchorus obclavatus.*** A. branchlet with fruit. × 1. B. fruit. × 4. C. ventral view of sepal. × 8. A–C from *Halford* Q1150 (BRI). Del. W. Smith.

rather than ± cylindrical. In addition, *C. obclavatus* differs from *C. sublatus* by having pendulous rather than erect fruit.

***Etymology*:** The specific epithet refers to the shape of the mature fruit; Latin *ob-* prefix reversed-, *clavatus* club shape, ie the club-shaped fruit is attached by the thicker end.

13. Corchorus parviflorus (Benth.) Domin, Biblioth. Bot. 89: 383 (1928); *Corchorus parviflorus* (Benth.) Domin var. *parviflorus*, Domin, Biblioth. Bot. 89: 383 (1928); *Corchorus walcottii* var. *parviflorus* Benth., Fl. Austral. 1: 279 (1863). **Type:** [Western Australia.] Nichol Bay, 1862, *F. Gregory*. (lecto: MEL [MEL223669]); isolecto: K *n.v.*, *fide* B. Rye, *Nuytsia* 9(3): 418 (1994); ?isolecto: MEL [MEL1599091]).

Corchorus parviflorus var. *gracilescens* Domin, Biblioth. Bot. 89: 383 (1928). **Type:** [Western Australia.] between the Ashburton and De Gray Rivers, *E. Clement* (syn: K); [Western Australia.] Mons Cupri, Whim Creek, *W.A. Michell* (syn: K).

Corchorus parviflorus var. *ovatus* Domin, Biblioth. Bot. 89: 383 (1928). **Type:** [Western Australia.] between the Ashburton and De Gray Rivers, *E. Clement* (holo: K).

Shrub to 1(–1.6) m high; stems much branched, spreading to erect. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of mostly stellate hairs but simple hairs also present. Stellate hairs sessile or sometimes stipitate, up to 1 mm across; stipes red-brown, straight, up to 0.2 mm long; rays soft, white, up to 0.2 mm long. Simple hairs glandular, dull yellow to red-brown, flexuous, up to 1.5 mm long. Leaves with petioles (3–)10–20(–35) mm long; stipules subulate-linear, 6–8 mm long; lamina ovate to broadly ovate or elliptic to broadly elliptic, (1–)1.5–4 cm long, (0.5–)1–3 cm wide, l:w ratio 1.1–2:1, concolorous; base rounded or slightly cordate; margin serrulate; apex obtuse to rounded. Inflorescences umbellate, 3–8-flowered, leaf-opposed, solitary at nodes; peduncles (2–)6–13 mm long; pedicels 2–5 mm long, spreading to erect in flower and fruit; bracts filiform-linear, 3–4 mm long. Flower buds ellipsoid, 3–4 mm across, apex obtuse with 5 spreading caudae to 1 mm long. Sepals 5, persistent, narrowly obovate-elliptic, 4–7 mm long, 1–2 mm wide; abaxial surface with a dense indumentum of stellate and simple hairs, the largest hairs up to 1.5 mm long; adaxial surface stellate-villose proximally, glabrous distally; apex acuminate-caudate, up to 1 mm long. Petals 5; lamina obovate, 3–6 mm long, 2–5 mm wide, glabrous; claw 0.5–0.7 mm long, sparsely stellate-pubescent on margins. Androgynophore 0.2–0.4 mm long; annulus entire, c. 0.2 mm long, glabrous. Stamens 43–73; filaments 2–4 mm long; anthers c. 0.4 mm long. Ovary globose, 1.5–2 mm across, densely stellate-villose, 3 or 4-locular, with 8–10 ovules in each locule; style 3–4 mm long. Fruits subcylindrical, 4–12 mm long, 2–3 mm across, 2–4 times longer than wide, spreading, straight, circular in transverse section, not conspicuously constricted between seeds, 3 or 4-valved; apex attenuate, 1–5 mm long; indumentum dense, of mostly stellate hairs but a few simple hairs also present, largest hairs up to 0.5 mm long. Seeds compressed obovoid, c. 2 mm long. **Fig. 11.**

***Selected specimens (from 17 examined)*: Western Australia.** Fortescue District: North West Coastal Highway, c.15 km by road WSW of main turnoff to Dampier, Aug 1977, *Jackson* 3033 (AD); Deep Hills runoff gully near Bullgarra Cell, Karratha, Sep 1985, *Glennon* 220 (PERTH); Point Samson, Jul 1981, *Craig* 214 (PERTH); 65 km N of Roebourne, Jul 1976, *Stacey* CIS463 (PERTH); Roebourne, Oct 1941, *Gardner* 6329 (PERTH); 15.8 km N of Talga, Sep 1986, *Chinnock* 6985 (AD); Soda Creek, Black Hills, Eginbah Station, Coongan, Jun 1941, *Burbidge* 998 (PERTH); 38 km NNW of Abydos, Jul–Aug 1987, *Ingleby* HW15 (PERTH); Abydos Station, S of Port Hedland, Sep 1961, *Richardson* 14 (PERTH); Woodstock Station, May 1958, *Burbidge* 5972 (AD, PERTH); c. 160 km S of Port Hedland towards Wittenoom, Apr 1977, *Pullen* 10.911 (CANB); near Marble Bar, Sep 1968, *Blockley* s.n. (PERTH); Mt Edgar, Feb–Mar 1938, *Stewart* 394 (PERTH); Hamersley Range, Aug 1932, *Gardner* s.n. [PERTH1522108] (PERTH)); head of Nullagine R., 54 km S of Nullagine along Great Northern Highway, Jun 1977, *Telford & Butler* 5927 (CANB).

***Distribution and habitat*:** *Corchorus parviflorus* is confined to the Pilbara region, Western Australia, from Karratha eastwards to Mt Edgar Station (**Map 1**). It is recorded as growing in hummock grassland and low open

Fig. 11. ***Corchorus parviflorus.*** A. branchlet with flowers and fruit. × 2. B. fruit with persistent sepals. × 4. C. ventral view of sepal. × 8. D. cross-section of sepal. × 24. E. stellate hair. × 48. F. simple glandular hair. × 24. A–F from *Jackson* 3033 (AD). Del. W. Smith.

woodland communities, on stony or sandy soils on hillslopes and plains. It is also recorded occasionally along watercourses.

***Phenology*:** Flowers have been collected from March to October, fruits in April and from August to October.

***Notes*:** *Corchorus parviflorus*, *C. laniflorus* and *C. walcottii* all have conspicuous simple glandular hairs present amongst the dense stellate indumentum on the stems, leaves and inflorescences. *Corchorus parviflorus* is most closely related to *C. laniflorus*. For a discussion on the differences between these species see 'Notes' under *C. laniflorus*. *Corchorus parviflorus* is distinguishable from *C. walcottii* by having persistent sepals and generally smaller leaves, flowers and fruits.

14. Corchorus puberulus Halford **sp. nov.** similis *C. leptocarpo* autem fructibus latioribus (3–4 mm latis non 2–3 mm latis) minus quam 10 plo longioribus quam latis inter semina non constrictis differt. *Corchorus puberulus* floribus ex sepalis 9–15 × 2–3 mm, petalis 9–10 × 4–7 mm filamentis staminalibus 4–6 mm

longis, stylo 4–6 mm compositis, pedunculis 5–7 mm longis, foliis 2–5 cm latis praeditus maxime arcte cognatus *C. aulacocarpo* qui ex flores minore, sepalis 6–9 × 1–2 mm, petalis 6–7 × 2–4 mm, stylo 2–4 mm longo compositos, pedunculos breviores 2–3 mm longos, interdum folia angustioria 0.8–2.5 cm lata habet. **Typus:** Western Australia. FITZGERALD DISTRICT: W end of Cockatoo Island airstrip, W Kimberley, 6 November 1985, *P.J. White* 27 (holo: PERTH).

Shrub to 1.5 m high; stems sparingly to much branched, erect. Indumentum on young shoots, branchlets, stipules, peduncles, pedicels and bracts grey-white, dense, comprised of mostly stellate hairs but with a few dendritic-stellate hairs also present. Stellate hairs sessile or stipitate, up to 0.2 mm across; stipes red-brown, straight, up to 0.2 mm long; rays pliable, white, up to 0.2 mm long. Dendritic-stellate hairs up to 0.3 mm long; stipes red-brown; rays pliable, white, up to 0.2 mm long. Leaves with petioles 7–17 mm long; stipules subulate-linear, 4–5 mm long; lamina ovate, 4.5–10 cm long, 2–5 cm wide, l:w ratio 2–2.9:1, discolorous; adaxial surface sparsely to moderately stellate hairy; abaxial surface moderately to densely stellate hairy; base rounded; margin serrate to serrulate; apex obtuse to acute. Inflorescences umbellate, 3–7-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 5–7 mm long; pedicels 5–8 mm long, spreading to erect in flower, recurved to erect in fruit; bracts subulate-linear, 2–3 mm long. Flower buds obovoid-ellipsoid, 4–5 mm across, longitudinally ridged; apex obtuse with 5 erect caudae to 2 mm long. Sepals 5, not persistent, narrowly obovate, 9–15 mm long, 2–3 mm wide; abaxial surface with a dense indumentum of stellate hairs up to 0.3 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex caudate, up to 4 mm long. Petals 5; lamina obovate to broadly obovate, 9–10 mm long, 4–7 mm wide, glabrous; claw c. 1 mm long, stellate-pubescent on margins. Androgynophore 0.4–0.7 mm long; annulus entire, c. 0.5 mm long, glabrous. Stamens 60–75; filaments 4–6 mm long; anthers c. 0.5 mm long. Ovary cylindrical, c. 1.5 mm across, densely stellate-puberulous, 4(rarely 3 or 5)-locular, with 40–44 ovules in each locule; style 4–6 mm long. Fruits subcylindrical, 10–30 mm long, 3–4 mm across, 3–8 times longer than wide, erect, straight or slightly curved or if on recurved pedicels then fruit abruptly bent near base so that the fruit is perpendicular with the apex pointing upwards, 4(rarely 3 or 5)-sided, obtusely angled in transverse section, not constricted between seeds, 4(rarely 3 or 5)-valved; apex acute to obtuse; indumentum moderately dense to dense, of stellate hairs; stellate hairs up to 0.3 mm long, 0.2 mm across. Seeds compressed obovoid, c. 2 mm long. **Fig. 12.**

***Additional specimens*: Western Australia.** GARDNER DISTRICT: 5.2 km SE of Mount Lochee, Jun 1987, *Kenneally* 10451 & *Hyland* (PERTH). FITZGERALD DISTRICT: Koolan Island, near Acacia Ore Body in central part of island, Jun 1985, *Fryxell* 4595 *et al.* (CANB, MEL); Crocodile Creek, Yampi Peninsula, W Kimberley Coast, May 1987, *Kenneally* 10117 (PERTH); Silver Gull Creek at spring, c. 14 km SE of Cockatoo Island, Apr 1983, *Fryxell* & *Craven* 3865 (BRI, CANB, DNA, MEL); 26 km W of Rankin Island, Collier Bay, W Kimberley Coast, Jun 1987, *Kenneally* s.n. & *Hyland* (PERTH)

***Distribution and habitat*:** *Corchorus puberulus* occurs on the islands and in the coastal areas of the Kimberley, Western Australia, from Cockatoo Island, Buccaneer Archipelago eastwards to Mt Lochee (**Map 4**). It is recorded as growing on the edge of vine thickets on soils derived from sandstone and in eucalypt woodland communities along dry creeks.

***Phenology*:** Flowers have been collected in April, fruits in April and June.

***Affinities*:** *Corchorus puberulus* is similar to *C. leptocarpus* but differs from that by having broader fruits (3–4 mm across compared with 2–3 mm across) which are < 10 times as long as wide, trigonous or tetragonous in transverse section and are not constricted between the seeds. *Corchorus puberulus* is most closely related to *C. aulacocarpus* but differs from that by having larger flowers (sepals 9–15 × 2–3 mm, petals 9–10 × 4–7 mm, staminal filaments 4–6 mm long mm long, style 4–6 mm long compared with sepals 6–9 × 1–2 mm, petals 6–7 × 2–4 mm, staminal filaments 3–4 mm long, style 2–4 mm long), longer peduncles (5–7 mm long compared with 2–3 long) and generally broader leaves (2–5 cm wide compared with 0.8–2.5 cm wide).

Fig. 12. ***Corchorus puberulus.*** A. branchlet with flowers. × 1.5. B. fruit. × 3. C. ventral view of sepal. × 4. A from *White* 27 (PERTH); B, C from *Fryxell et al.* 4595 (CANB). Del. W. Smith.

***Etymology*:** The epithet alludes to the somewhat dense cover of short, fine, soft hairs on most plant parts; Latin *puberulus* minutely pubescent.

15. Corchorus pumilio R.Br. ex Benth., Fl. Austral. 1: 277 (1863). **Type:** [Northern Territory.] Carpentaria island r[Burney Island] No 32 desc., [19 Jan 1803,] *R. Brown* (lecto, here chosen: K; ?isolecto: BRI, CANB, MEL, NSW).

Shrub to 0.4 m high; stems much branched, spreading; young shoots with greyish white or rarely ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, sparse to moderately dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 1.2 mm across; stipes white, straight, up to 0.1 mm long; rays firm, white, up to 1 mm long. Leaves with petioles 1–6(–25) mm long; stipules subulate-linear, 2–5 mm long; lamina oblong,

oblong-elliptic or rarely narrowly elliptic, 0.6–3.5 cm long, 0.4–1.4 cm wide, l:w ratio 1.5–3:1, concolorous; base cuneate to obtuse; margin serrulate to serrate; apex rounded or rarely acute rarely. Inflorescences umbellate, 3–6-flowered, leaf-opposed or lateral, 1 or 2 per node; peduncles c. 1 mm long; pedicels 1–3 mm long, spreading to erect in flower, recurved in fruit; bracts filiform-linear, 1–3 mm long. Flower buds obovoid-ellipsoid, 1–2 mm across; apex acuminate with 4 or 5 erect caudae to 0.5 mm long. Sepals 4 or 5, not persistent, linear to narrowly obovate, 3–6 mm long, 0.5–1 mm wide; abaxial surface with a moderately dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex acuminate, up to 0.5 mm long. Petals 4 or 5; lamina narrowly obovate to obovate, 2–5 mm long, 0.5–2 mm wide, glabrous; claw 0.3–0.5 mm long, stellate-pubescent on adaxial surface and margins. Androgynophore 0.1–0.3 mm long; annulus entire, c. 0.1 mm long, glabrous. Stamens 5–15(–20); filaments 2–4 mm long; anthers c. 0.5 mm long. Ovary cylindrical or subglobose, 0.2–0.4 mm across, densely stellate-tomentose, 2(rarely 3)-locular, with 2–6 ovules in each locule; style 2–3 mm long. Fruits subcylindrical, 3–10(–14) mm long, 1–2 mm across, 1.5–7 times longer than wide, spreading to pendulous, straight, slightly curved or twisted, circular in transverse section, slightly or markedly constricted between seeds, 2(rarely 3)-valved; apex attenuate, 1–2 mm long; indumentum dense, of stellate hairs up to 0.7 mm long. Seeds compressed obovoid, 1–2 mm long.

***Selected specimens (from 58 examined)*: Western Australia.** Gardner District: c. 10 km SE of shore of King George R., 5 km W of shore of Timor Sea, Jun 1985, *Fryxell* 4821 *et al.* (CANB, MEL, PERTH); headwaters of Packsaddle Creek, Northern Carr Boyd Ranges, Mar 1978, *Hartley* 14359 (CANB, DNA). Fitzgerald District: creek entering an inlet of Talbot Bay, 23 km SE of Cockatoo Island, Apr 1983 *Fryxell & Carven* 3884 (AD, CANB); opposite Bold Bluff along Milliwindi [Milliewindie] track, Leopold Range, Apr 1988, *Cranfield* 6384 (PERTH). Dampier District: One Arm Point, N Dampier Peninsula, Mar 1989, *Carter* 362 (BRI, DNA, PERTH). Canning District: Godfrey Tank, Southesk Tablelands, Apr 1979, *George* 15452 (AD, DNA, PERTH). **Northern Territory.** Darwin and Gulf Region: Roper Bar road, 80 km E of Stuart Highway, Apr 1992, *Halford* Q1090 (BRI); 45 km SSW of Legune Station, Mar 1989, *Russell-Smith* 7561 & *Brock* (DNA); 500 m N of Larrimah, Stuart Highway, Apr 1992, *Halford* Q1196 (BRI); 144 miles [c. 232 km] E of Stuart Highway on Borroloola road, Jun 1971, *Dunlop* 2180 (AD, CANB, DNA, MEL). Victoria River Region: Jasper Gorge, Jul 1974, *Carr* 2833 & *Beauglehole* 46612 (MEL). Central Southern Region: Simpsons Gap NP, Apr 1974, *Latz* 4885 (DNA). **Queensland.** Cook District: Fanneys Creek, 86 km W of Georgetown, E of Gilbert R., Apr 1992, *Halford* Q973 (BRI); Turtle Rock area, SE of Laura, Jan 1993, *Bean* 5503 & *Forster* (BRI). Burke District: Settlement Creek, Feb 1923, *Brass* 257 (BRI, CANB); c. 35 km W of Cloncurry on Cloncurry–Mt Isa road, Mar 1977, *Schmid* AS179 (BRI); 20 km S of Mt Isa on road to Boulia, Jun 1991, *Halford* Q454 (BRI). North Kennedy District: Marble Creek mesa, SE of Greenvale, Apr 1991, *Bean* 2940 (BRI). South Kennedy District: slopes of Mt Hope, Apr 1992, *Thompson & Simon* BUC446 (AD, BRI, DNA, NSW).

***Distribution and habitat*:** *Corchorus pumilio* is widespread across northern Australia from the Kimberley, Western Australia to north-eastern Queensland (**Map 2**). It is recorded as growing in open woodland and hummock grassland communities, on shallow rocky, stony or sandy soils, on hills, ridges and rocky outcrops.

***Phenology*:** Flowers and fruits have been collected from February to August and in November.

***Typification*:** In the protologue of *Corchorus pumilio*, Bentham (1863) cited two collections "islands of the Gulf of Carpentaria, R. Brown" and "Upper Victoria River , F. Mueller". Seven sheets of probable type material of *Corchorus pumilio* have been located. Six sheets of the R. Brown collections have been located (two from K and one each at BRI CANB, MEL, NSW) and one sheet of the F. Mueller collection "Tableland between the Victoria River and Sturts Creek, Feb 1856" located at K with the name *C. pumilio* in red pencil in Bentham's hand. The sheet at Kew of R. Brown's collection labelled "Corchorus No. 32 desc. Carpentaria island r" is chosen here as lectotype, because it is part of the original material and has mature fruit. Whether the other R. Brown sheets (MEL, BRI, CANB, K, NSW) are all from the same collection as the lectotype or separate collections has not been ascertained.

***Notes*:** *Corchorus pumilio* is confused with *C. sidoides* but is distinguished from that by having shorter fruit, smaller flowers, generally fewer stamens in each flower and a sparser indumentum on the leaves and stems.

The typical widespread form of *C. pumilio* is a slender herbaceous shrub, generally green in appearance with a sparse to moderately dense, coarse white indumentum on all parts. The collections *Carr* 3784 & *Beauglehole* 47562 (PERTH)(Geikie Gorge NP) and *Hartley* 14344 (CANB, DNA, PERTH)(Carr Boyd Ranges) from the Kimberley, Western Australia have a more robust habit than the typical form of *C. pumilio* and have a ferruginous indumentum on the young shoots. These collections may represent a distinct species but further collections and study are required.

16. Corchorus sericeus Ewart & O.B.Davies, Fl. N. Terr. 178 (1918). **Type:** Northern Territory. DARWIN AND GULF REGION: Borroloola, 9 Oct 1911, *G. F. Hill* (holo: MEL [MEL223676]; iso: DNA, NSW).

Spindly or compact shrub to 1.5 m high; stems sparingly to much branched, spreading to erect. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of mostly stellate hairs but dendritic-stellate and simple hairs also present. Stellate hairs sessile or stipitate, up to 1.2 mm across; stipes red-brown or white, straight or tortuous, up to 0.2 mm long; rays soft to pliable, white or rarely ferruginous, up to 0.6 mm long. Dendritic-stellate hairs up to 1.5 mm long; stipes white or red-brown, tortuous; rays pliable, white, up to 0.6 mm long. Simple hairs glandular, white, flexuous, up to 0.2 mm long. Leaves with petioles 4–15(–20) mm long; stipules subulate-linear, 2–10 mm long; lamina narrowly to broadly ovate or elliptic-ovate, 1.5–7.5 cm long, 0.6–3 cm wide, l:w ratio 2–3:1, discolorous or concolorous; base obtuse to rounded or rarely cordate; margin serrulate; apex acute to rounded. Inflorescences umbellate or racemose, 3–10-flowered, leaf-opposed, solitary at upper nodes; peduncles 1–10 mm long; pedicels 1–7 mm long, spreading to erect in flower and fruit; bracts subulate-linear, 2–10 mm long. Flower buds ellipsoid, 2–5 mm across; apex obtuse with 5 spreading caudae to 5 mm long. Sepals 5, persistent, narrowly obovate-elliptic, 4–14 mm long, 1–3 mm wide; abaxial surface with a dense indumentum of stellate and dendritic-stellate hairs, the largest hairs up to 1 mm long; adaxial surface villose proximally, glabrous distally; apex caudate, up to 5 mm long. Petals 5; lamina obovate, 3–7 mm long, 1–5 mm wide, glabrous; claw 0.4–1 mm long, sparsely pubescent. Androgynophore 0.1–0.3 mm long; annulus entire, 0.2–0.4 mm long, glabrous. Stamens 25–80; filaments 2–5 mm long; anthers c. 0.3. Ovary globose, 0.7–2 mm across, densely stellate-tomentose, 3(rarely 4)-locular, with 2–8 ovules in each locule; style 2–5 mm long. Fruits globose, 2–4 mm across, circular in transverse section, not constricted between seeds, 3(rarely 4)-valved; apex rounded rarely obtuse; indumentum dense of stellate hairs up to 0.7 mm long. Seeds compressed obovoid, c. 2 mm long.

***Notes*:** *Corchorus sericeus* is most closely related to *C. laniflorus* but differs from that in having smaller flowers and fruits, and generally shorter and coarser indumentum on most parts.

Corchorus sericeus as recognised here, occurs from the Devils Marbles, Northern Territory eastwards to Georgetown, Queensland. Two subspecies are recognised and can be distinguished using the following key.

Spindly shrubs to 1.5 m high; stems erect; primary stem unbranched for at least 10 to 20 cm above ground level; inflorescences racemose, 7–10-flowered; peduncles 4–15 mm long ..... **16a. C. sericeus** subsp. **sericeus**

Open to compact shrubs to 1 m high; stems spreading; primary stem branched at ground level; inflorescences umbellate, up to 5-flowered; peduncles up to 2 mm long ..... **16b. C. sericeus** subsp. **densiflorus**

16a. Corchorus sericeus Ewart & O.B.Davies subsp. **sericeus**

Erect spindly shrub up to 1.5 m high. Primary stem unbranched for at least 10 to 20 cm above ground level. Leaves narrowly to broadly ovate, acute to obtuse at apex. Inflorescences racemose, 7–10-flowered; peduncles 4–15 mm long. Indumentum on abaxial surface of sepals comprised of mostly stellate hairs.

***Selected specimens (from 23 examined)*: Northern Territory.** Darwin and Gulf Region: White Islet, May 1977, *McKey* 181 (AD, DNA, MEL); 2 km East Lake Eames, Vanderlin Island, Sir Edward Pellew Group, Jul 1988, *Thomson* 2489 (BRI); Favenc Range, c. 160 km from Borroloola on the road to Daly Waters, May 1974, *Pullen* 9316 (CANB, DNA); near McArthur R., May 1947, *Blake* 17762 (BRI, MEL). Barkly Tablelands Region: Kilgour Gorge, Mallapunyah Station, May 1984, *Thomson* 629 (DNA); 30 miles [c. 48 km] S of McArthur River Station, Jul 1948, *Perry* 1692 (CANB, DNA, MEL); 4 miles [c. 6 km] N of Wollogorang Station, Jun 1948, *Perry* 1175 (BRI, CANB, DNA); Wollogorang Station, Jun 1974, *Henshall* 423 (CANB, DNA); 15 km SW of Calvert Hills Station, on road to Barkly Highway, Jun 1991, *Halford* Q585 (BRI). **Queensland.** Burke District: Buchanan Creek W of "Westmoreland" near the Queensland/Northern Territory border, May 1974, *Pullen* 9206 (BRI, CANB, DNA); 3 miles [c. 5 km] W of Westmoreland Station, Jun 1948, *Perry* 1350 (CANB, DNA).

***Distribution and habitat*:** *Corchorus sericeus* subsp. *sericeus* occurs in the subcoastal areas around the Gulf of Carpentaria from Favenc Range, Northern Territory to Westmoreland Station in north-west Queensland (**Map 8**). It is recorded as growing in open woodland communities, on shallow sandy or gravelly soils on sandstone or quartzite ridges. It is also recorded on alluvial loams along watercourses.

***Phenology*:** Flowers have been collected from April to July, fruits from April to June.

***Notes*:** The collection *Craven* 3911 (BRI, CANB, DNA) from the MacArthur River area, Northern Territory has atypically long racemose inflorescences and the whole plant is generally more hairy than in the typical form of *C. sericeus* subsp. *sericeus*.

16b. Corchorus sericeus subsp. **densiflorus** (Benth.) Halford **comb. nov. & stat. nov.**

Corchorus walcottii var. *densiflorus* Benth, Fl. Austral. 1: 279 (1863), 'densiflora'. **Type:** Gulf of Carpentaria, [without date,] *F. Mueller* (lecto, here chosen: K (left hand element); isolecto: MEL [MEL227034]).

Open to compact shrub to 1 m high. Primary stem branched at ground level. Leaves narrowly ovate to ovate or elliptic-ovate, obtuse to rounded rarely acute at apex. Inflorescences umbellate, up to 5-flowered; peduncles up to 2 mm long. Indumentum on abaxial surface of sepals comprised of stellate and dendritic-stellate hairs.

***Selected specimens (from 47 examined)*: Northern Territory.** Darwin and Gulf Region: Upper Wearyan R., Jan 1989, *Russell-Smith* 7004 & *Lucas* (DNA). Barkly Tablelands Region: 4 km S [of] Spear Waterhole, Wollogorang, Jan 1989, *Russell-Smith* 6851 & *Lucas* (DNA); 4 km W of No. 16 Bore, Benmara Station, May 1984, *Strong* 160 (DNA); 3 km N of No. 19 Bore, Benmara Station, May 1984, *Low* 17 (DNA); 10 miles [c. 16 km] NE of Alexandria Station, Jun 1948, *Perry* 1487 (AD, BRI, CANB, DNA, MEL, PERTH); 69 km N of Tennant Creek on Stuart Highway, Jun 1991, *Halford* Q537 (BRI); Gibsons Creek, 35 miles [c. 56 km] N of Tennant Creek, Jul 1968, *Must* 195 (AD, BRI, CANB, MEL). Central Northern Region: Devils Marbles, Mar 1955, *Chippendale* 937 (BRI, DNA). **Queensland.** Cook District: Blue Hills, "Mount Surprise", 49 km from Mount Surprise township, Mar 1988, *Champion* 350 (BRI); on Gulf Development Road, near bridge, 1 km E of Georgetown, Apr 1990, *Batianoff* 900402a & *Smith* (BRI). Burke District: Lawn Hill NP, "Island Stack", Jul 1985, *Williams* 85070 (BRI); Bang Bang Jumpup to N of Donors Hill, Apr 1974, *Pullen* 8911 (BRI, CANB, DNA); 28.5 km from Mary Kathleen–Barkly Highway junction on traverse to Mt MacNamara, May 1975, *Catt* & *Cole* 9221 (BRI, CANB); Cloncurry, Aug 1930, *Blake* 12649 (BRI); 5 km N of Barkly Highway on road to Lake Julius, Jun 1991, *Halford* Q511 (BRI); 3 miles [c. 5 km] SE of Cloncurry township, Mar 1954, *Lazarides* 4411 (BRI, CANB, DNA, MEL, PERTH).

***Distribution and habitat*:** *Corchorus sericeus* subsp. *densiflorus* occurs from the Devils Marbles, Northern Territory eastwards to Georgetown, Queensland and from Sir Edward Pellew Group, Northern Territory southwards to Burnham Station, Queensland (**Map 9**). It is recorded as growing in shrubland and open woodland communities, mostly on shallow sandy or stony soils, on rocky hills or plains but also rarely on heavy alluvial soils along drainage lines.

***Phenology*:** Flowers have been collected from January to November, fruits from March to July.

***Notes*:** The distinguishing characters of this subspecies are indicated in the key above.

The size of flowers and leaves, and the thickness of indumentum on the abaxial surface of the sepals varies greatly in this subspecies as circumscribed here. The variation appears to be continuous with no clear gaps that would allow the subdivision of this taxon based on any of these characters.

17. Corchorus sidoides F.Muell., Fragm. 3: 9 (1862). **Type:** [Northern Territory.] Victoria River, May 1856, *F. Mueller* (lecto, here chosen: MEL [MEL220812]).

Shrub to 1.5 m high; stems much branched, procumbent to erect; young shoots with grey-white or ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels, and bracts grey-white, moderately dense to very dense or rarely sparse, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 1.8 mm across; stipes white or ferruginous, straight, up to 0.3 mm long; rays firm to pliable, white or ferruginous, up to 1 mm long. Leaves with petioles 1–20 mm long; stipules subulate-linear, 1–8 mm long; lamina narrowly oblong, oblong-elliptic, narrowly elliptic, ovate-elliptic, narrowly ovate to ovate or narrowly obovate, 0.6–9 cm long, 0.2–3 cm wide, l:w ratio 2–3.5:1, concolorous or discolorous; base obtuse, rounded or attenuate; margin dentate-serrate or serrate to serrulate; apex acute to rounded. Inflorescences umbellate, 4–7-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 0.5–5 mm long; pedicels 1–5 mm long, spreading to erect in flower, recurved in fruit; bracts subulate-linear to filiform-linear; 0.7–3 mm long. Flower buds obovoid to obovoid-ellipsoid, 1–3 mm across, sometimes longitudinally ridged; apex obtuse to acuminate-caudate with 4 or 5 erect caudae to 1 mm long. Sepals 5(rarely 4), not persistent, narrowly obovate, 3–9 mm long, 1–2 mm wide; abaxial surface with a moderately dense to very dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface glabrous or stellate-puberulous to stellate-villose proximally; apex acute or acuminate-caudate, up to 1.5 mm long. Petals 5, rarely 4; lamina narrowly obovate to obovate, 2–7 mm long, 0.5–4 mm wide, glabrous; claw 0.5–0.8 mm long, stellate-pubescent on margins. Androgynophore 0.1–0.4 mm long; annulus entire or sinuate, 0.1–0.4 mm long, glabrous. Stamens (16–)20–50; filaments 2–5 mm long; anthers 0.3–0.5 mm long. Ovary cylindrical, 0.5–1 mm across, densely stellate-puberulous or densely stellate-villose, 2 or 3-locular, with 6–24 ovules in each locule; style 1–4 mm long. Fruits subcylindrical (5–)18–60 mm long, 1–3 mm across, mostly 6–20 times longer than wide, spreading or pendulous, straight, curved or very much twisted, circular in transverse section, slightly or markedly constricted between seeds, 2 or 3-valved; apex attenuate up to 4 mm long, orientated downward; indumentum moderately dense to dense, of stellate hairs up to 1 mm long. Seeds compressed obovoid, 1.5–3 mm long. Chromosome n = 6, 8 and 7; 2n = 14 (Basak 1958).

***Typification*:** In the protologue of *Corchorus sidoides*, Mueller (1862) did not cite any particular collection but stated "In locis sterilioribus secus flumen Victoriae frequens" [frequent in barren places along the Victoria River]. Three sheets [MEL220811, MEL220812, MEL227306] on loan to BRI from MEL have been located that are labelled *C. sidoides* and have Mueller as the collector with the locality of collection as Victoria River. The collection of this material would have occurred during the Gregory expedition (1855–1857) to northern Australia and predates the publication of the name *C. sidoides*. The MEL sheet marked MEL220812 is selected as lectotype of the name *Corchorus sidoides* F.Muell. as it agrees with the protologue and is the more complete collection.

***Notes*:** *Corchorus sidoides* is the most widespread and common *Corchorus* species across northern Australia. It is characterised by having generally a spreading habit, relatively long pendulous subcylindrical fruits, a stellate indumentum on the fruit, sepals that are not persistent and leaves that are mostly oblong, oblong-elliptic or ovate-elliptic in outline. It is most closely related to *C. carnarvonensis*, C.*congener*, *C. pumilio* and *C. tomentellus*. For differences from these species refer to 'Affinities' and 'Notes' under each species.

Corchorus sidoides is morphologically variable, particularly in degree of fruit distortion, shape and size of leaves and size of stellate hairs. The types of both *C. vermicularis* and *C. rostrisepalus* fall within the variation of *C. sidoides* as circumscribed here. The extreme forms within this species differ considerably, but due to the difficulty in assigning material to one or other forms I have used the rank of subspecies to recognise these forms rather than maintaining the previously recognised species. Three subspecies are recognised and can be distinguished using the following key.

1. Stems erect; indumentum on young shoots and buds ferruginous; hairs fine, < 0.4 mm across; leaves narrowly ovate or narrowly elliptic, 3.5–9 cm long, 1.5–3 cm wide; fruits straight or slightly curved, prominently constricted between seeds. ..... **17c. C. sidoides** subsp. **rostrisepalus**
   Stems procumbent or spreading horizontally or if erect then other characters not as above 2

2. Fruits 2-valved rarely 3-valved, dark purplish-red rarely brown, 1–1.5 mm across, weakly or strongly twisted; leaf laminae narrowly oblong or narrowly oblong-elliptic rarely narrowly obovate, 0.6–3.5(–4) cm long, 0.2–1(–1.5) cm wide; stellate hairs white, up to 0.5 mm across. ..... **17b. C. sidoides** subsp. **vermicularis**
   Fruits mostly 3-valved occasionally 2-valved, pale-green to brown, 1–2.5 mm across, straight, curved or weakly twisted; leaf laminae ovate-elliptic or narrowly ovate to ovate, occasionally narrowly oblong-elliptic or narrowly oblong, 2–6 cm long, 0.8–2.5 cm wide; stellate hairs white or ferruginous, up to 2 mm across. ..... **17a. C. sidoides** subsp. **sidoides**

17a. **Corchorus sidoides** F.Muell. subsp. **sidoides**

Compact shrub to 0.9 m high; stems much branched, spreading, rarely erect. Indumentum on young shoots and buds grey-white. Stellate hairs up to 2 mm across, sessile or stalked; stalks white or ferruginous, up to 0.3 mm long; rays white, up to 1 mm long, pliable to stiff. Leaves with petioles (2–)4–20 mm long; lamina narrowly oblong-elliptic, ovate-elliptic, narrowly ovate to ovate or narrowly obovate, 2–6 cm long, 0.8–2.5 cm wide, concolorous or discolorous; adaxial and abaxial surfaces moderately dense to very dense stellate hairy; base rounded; margin serrate; apex acute to obtuse or rounded. Flower buds obovoid, 2–3 mm across; apex acute with 5 erect caudae to 0.5 mm long. Sepals 5, narrowly obovate, (3–)4–8(–9) mm long, 1–2 mm wide; apex acute or acuminate-caudate, 0.5–1.5 mm long; abaxial surface with moderately dense to very dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface glabrous or stellate-villose proximally. Stamens (16–)20–50. Fruits (5–)18–60 mm long, 1–3 mm across, pale-green to brown, straight, curved or rarely weakly twisted, weakly to strongly constricted between the seeds, 3(occasionally 2)-valved; apex attenuate up to 3 mm long; indumentum moderately dense to dense, of stellate hairs up to 0.5 mm long. Chromosome No. 2n = 14 (Datta *et al.* 1966)

***Selected specimens (from 167 examined)*: Western Australia.** Gardner District: Ivanhoe Station, Ord R., Jun 1944, *Gardner* 7409 (PERTH). Dampier District: Gogo, May 1951, *Gardner* 10254 (PERTH). Fitzgerald District: Sandy River Gorge, Leopold Gorge, Apr 1988, *Cranfield* 6570 (PERTH). Fortescue District. 19.9 km S of Wittenoom turnoff on the Great Northern Highway, Sep 1986, *Chinnock* 7015 (AD); 9 km SW of Mt Cecelia, c. 90 km SE of Shay Gap, Jul 1984, *Newbey* 10553 (CANB, PERTH). Canning District: Little Sandy Desert, May 1979, *Mitchell* 921 (AD, DNA); head of Breaden Valley, Southesk Tablelands, Apr 1979, *George* 15504 (DNA, PERTH). Keartland District: Rudall R. area, Aug 1971, *Wilson* 10585 (MEL, PERTH). Carnegie District: 39 miles [c. 63 km] W of Jupiter Well, Jul 1967, *George* 9087 (PERTH). **Northern Territory.** Darwin and Gulf Region: c. 2 km S of Larrimah on Stuart Highway, May 1985, *Fryxell* 4429 *et al.* (DNA, MEL). Victoria River Region: Bullita Station, Gregory NP, Feb 1986, *Wightman* 2565 & *Clark* (DNA); Pinkerton Range, Mar 1989, *Dunlop* 8121 & *Leach* (DNA, MEL); 20.8 miles [c. 33 km] W [of] Inverway, May 1959, *Chippendale* 5945 (CANB, DNA, PERTH). Central Northern Region: Native Gap, 71 miles [c. 114 km] N of Alice Springs, Jan 1969, *Nelson* 1828 (AD, BRI, DNA, MEL). Central Southern Region: 8 miles [c. 13 km] SE of Aileron, Mar 1955, *Winkworth* 863 (MEL); Harts Range, 10 km S of Harts Range Police Station, Oct 1977, *Noble* 21 (CANB); base of breakaway – upper talus slope, Ruby Gap, Jul 1982 *Purdie* 2386 (CANB); Stokes Creek, Oct 1981, *Latz* 8916 (DNA). **Queensland.** Burke District: 10 km SW of Mt Isa on the road to Dajarra, Jun 1991, *Halford* Q520 (BRI). Gregory North District: Warlus VI, Site R13, Mt Datson (ENE of Boulia), Sep 1977, *Purdie* 1026 (BRI).

***Distribution and habitat*:** *Corchorus sidoides* subsp. *sidoides* is widespread across northern Australia from the Pilbara, Western Australia through the Northern Territory to north-western Queensland (**Map 3**). It is recorded as growing in hummock grassland, open woodland and open forest communities, on sandy, loamy,

gravelly or clay soils, on sand dunes, plains and hills.

***Phenology*:** Flowers and fruits have been collected throughout the year.

***Notes*:** A number of collections from around the Arnhem Land escarpment (eg. *Martensz & Schodde* AE701 (BRI, CANB, MEL), *Dunlop* 4571 (DNA), *Telford & Wrigley* 7589 (CANB), *Wightman* 1382 & *Craven* (BRI) and *Halford* Q1116 (BRI)) have shorter fruit than typical (5–10 mm long) and a ferruginous indumentum on the young shoots and flower buds.

The collections from near Kununurra (*Pullen* 10.879 (CANB) and *Mackenzie* 710209-6 (CANB) are typical in leaf size and indumentum but have shorter fruit than typically found in the species.

The collection *Pullen* 10.764 (BRI, CANB) has a fairly erect habit to 1.5 m high with the lower stem free of branches and has generally smaller flowers and fruits than typical, growing on red earths in shrub-grassland.

Further collection and fieldwork may show that a number of these entities warrant formal recognition at specific or subspecific rank.

17b. Corchorus sidoides subsp. **vermicularis** (F.Muell.) Halford **comb. nov. & stat. nov.**

Corchorus vermicularis F.Muell., Fragm. 3: 10 (1862). **Type:** [Western Australia/ Northern Territory.] Head of Sturts Creek, Feb 1856, *F. Mueller* (holo: MEL [MEL220810]).

Scorpia simplicifolia Ewart & A.H.K.Petrie, Proceedings of the Royal Society of Victoria ser. 2, 38 (1926). **Type:** Northern Territory. Wycliffe, June 1924, *A.J. Ewart* (holo: MEL [MEL227302]).

Diffuse shrub to 0.5 m high; stems much branched, spreading. Indumentum on young shoots and buds grey-white. Stellate hairs up to 0.5 mm across, sessile or stalked; stalk white or reddish-brown, up to 0.1 mm long; rays white, up to 0.3 mm long, stiff. Leaves with petioles 1–5(–10) mm long; lamina narrowly oblong, oblong-elliptic or rarely narrowly obovate, 0.6–3.5(–4) cm long, 0.2–1(–1.5) cm wide, concolorous; adaxial surface sparsely to densely stellate hairy or rarely glabrous; abaxial surface sparsely to densely stellate hairy; base obtuse to rounded or rarely attenuate; margin serrate or dentate-serrate; apex obtuse to rounded or rarely acute. Flower buds obovoid-ellipsoid, 1–2 mm across; apex obtuse with 4 or 5 erect caudae to 0.2 mm long. Sepals 5, rarely 4, narrowly obovate, 4–7 mm long, 1–2 mm wide; apex acuminate c. 0.7 mm long; abaxial surface with moderately dense to dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface puberulous proximally, glabrous distally. Stamens 20–30(–40). Fruits 20–35 mm long, 1–2 mm across, dark purplish-red or rarely brown, weakly to strongly twisted, strongly constricted between the seeds, 2(rarely 3)-valved; apex attenuate up to 4 mm long; indumentum moderately dense to dense, of stellate hairs up to 0.3 mm long.

***Selected specimens (from 67 examined)*: Western Australia.** Dampier District: St Mary's School, Broome, Apr 1987, *Foulkes* 13 (CANB, PERTH); Munkajarra [Munkayarra], 20 km S of Derby, Apr 1983, *Fryxell* 3848 (CANB, MEL, PERTH); 9 km SE of Frazier Downs Station, Jul 1987, *Ingleby* JV28 (PERTH), c. 1225 km on North West Coastal Highway, Aug 1971, *Ashby* 3034 (AD); old Fitzroy R. crossing, Apr 1988, *Cranfield* 6414 (CANB, PERTH). Canning District: N of Dragon Tree Soak, Great Sandy Desert, Aug 1977, *George* 14768 (CANB, PERTH); just S of Tobin Lake, Great Sandy Desert, May 1979, *George* 15649 (CANB, DNA, PERTH). **Northern Territory.** Darwin and Gulf Region: 75 km E of Stuart Highway along Carpentaria Highway, Apr 1992, *Halford* Q1073 (BRI). Barkly Tablelands Region: 8 miles [c. 13 km] S of old Highland Plains, Jul 1976, *Henry* 253 (AD, DNA, MEL); 30 km N of Tennant Creek, Stuart Highway, Apr 1992, *Halford* Q1201 (BRI). Northern Central Region: Sangsters Bore, Tanami Desert, Sep 1978, *Henshall* 2277 (DNA); 2 km W of Lake Surprise, Tanami Desert, Jun 1985, *Latz* 10072 (DNA); 77 miles [c. 124 km] WSW [of] The Granites, Aug 1970, *Dunlop* 1812 (CANB, DNA); Central Mt Stuart, Jul 1974, *Latz* 5571 (BRI, CANB). **Queensland.** Cook District: site EU293, Barwidgee Homestead, E of Branch Creek, Feb 1992, *Godwin* C3718 (AD, BRI, DNA); 22 km E of Croydon, Apr 1992, *Halford* Q986 (BRI). Burke District: between Doomadgee Aboriginal Station and old "Corinda" outstation, May 1974, *Pullen* 9077 (CANB, DNA). Gregory North District: Oban Station, about 62 miles [c. 100 km] SW of Mt Isa, Woodend Bore, Dec 1947, *Everist* 3342 (BRI, CANB). Mitchell District: near Lochnagar, Nov 1935, *Blake* 10302 (BRI, CANB). South Kennedy District: 27.5 km W of St Anns Homestead, Jun 1992, *Thompson & Sharpe* BUC838 (BRI).

***Distribution and habitat*:** *Corchorus sidoides* subsp. *vermicularis* is widespread across northern Australia from the Pilbara, Western Australia, through the Northern Territory to the north-east coast of Queensland (**Map 5**). It is recorded as growing on sandy, loamy or gravelly soils, in hummock grassland, shrubland, open woodland and open forest communities, on plains, sand dunes and hills.

***Phenology*:** Flowers and fruits have been collected throughout the year.

***Notes*:** Generally a smaller more diffuse shrub than the other subspecies with slender stems, smaller leaves and twisted fruit. In the Kimberley region this subspecies grades into small leaf forms of *C. sidoides* subsp. *sidoides*.

17c. Corchorus sidoides subsp. **rostrisepalus** (Domin) Halford **comb. nov. & stat. nov.**

Corchorus rostrisepalus Domin, Biblioth. Bot. 89: 383 (1928). **Type:** [Northern Territory.] Carpentaria Island g, [Vanderlin Island, 15 Dec 1802,] *R. Brown* (lecto, here chosen: K; ?isolecto: BRI, CANB, MEL).

Shrub to 1 m high; stems sparingly to much branched, erect. Indumentum on young shoots and buds ferruginous. Stellate hairs up to 0.3 mm across, sessile or stalked; stalks white or reddish-brown, up to 0.2 mm long; rays white or ferruginous, up to 0.2 mm long, pliable. Leaves with petioles 3–13 mm long; lamina narrowly ovate or narrowly elliptic, 3.5–9 cm long, (0.5–)1.5–3 cm wide, discolorous; adaxial and abaxial surfaces moderately dense to dense or rarely sparsely stellate hairy; base obtuse or attenuate; margin serrate to serrulate; apex obtuse or acute. Flower buds obovoid, 2–3 mm across, longitudinally ridged distally; apex acuminate with 5 erect caudae to 1 mm long. Sepals 5, narrowly obovate, 5–6 mm long, c. 2 mm wide; apex acuminate-caudate up to 1 mm long; abaxial surface with moderately dense to dense indumentum of stellate hairs up to 0.2 mm long; adaxial surface stellate-pubescent proximally, glabrous distally. Stamens 30–35. Fruits 20–55 mm long, 1–2 mm across, pale-green to brown, straight or slightly curved, prominently constricted between seeds, 2(rarely 3)-valved; apex attenuate up to 4 mm long; indumentum moderately dense, of stellate hairs up to 0.2 mm long.

***Selected specimens (from 15 examined)*: Northern Territory.** Darwin and Gulf Region: 17 miles [c. 27 km] NNE [of] Mainoru, Jun 1972, *Byrnes* 2613 (DNA); South Bay, Bickerton Island, in the Gulf of Carpentaria, Jun 1948, *Specht* 605 (AD, BRI, CANB, MEL, NSW); Groote Eylandt, 4 km W [of] Umbakumba, Jul 1987, *Russell-Smith* 2738 & *Lucas* (DNA); Hemple Bay, Groote Eylandt, in the Gulf of Carpentaria, Apr 1948, *Specht* 283 (AD, BRI, CANB, MEL, NSW); Angurugu, Groote Eylandt, May 1972, *Levitt* [DNA 4462] (DNA); Nitmiluk Gorge NP, Feb 1990, *Evans* 2938 (DNA, CANB, MEL); Katherine Gorge [Nitmiluk] NP, Mar 1971, *Dunlop & Byrnes* 2157 (CANB, DNA, MEL); 12 miles [c. 19 km] NE of Katherine, Jan 1965, *Wilson* 79 (CANB, DNA); mouth of Rosie Creek, Lorella, Jan 1989, *Russell-Smith* 6752 & *Lucas* (BRI, DNA).

***Distribution and habitat*:** *Corchorus sidoides* subsp. *rostrisepalus* occurs in north-eastern Northern Territory from near Katherine eastward to the islands of the Gulf of Carpentaria (**Map 5**). It is recorded as growing in open woodland and open forest communities, on shallow rocky soils on hills or sandy soils on alluvial flats.

***Phenology*:** Flowers have been collected June, July and from December to April, fruits in December, January and from March to June.

***Notes*:** *Corchorus sidoides* subsp. *rostrisepalus* has a more erect habit, and generally a finer indumentum on its leaves and stems than the other subspecies of *Corchorus sidoides*.

***Typification*:** In the protologue of *C. rostrisepalus*, Domin (1928) referred to ' Carpentaria Islands, R. Brown als *C. vermicularis*'. There are three sheets at K of original Brown material from the Carpentaria Islands. The sheet with the small label with the information 'Corchorus vermicularis No. 45 desc. Carpentaria Island g' in Browns handwriting is here selected as lectotype. There are a number of possible duplicates of this material at a number of institutions (BRI, MEL, CANB) that have varying label details. Whether these other R. Brown sheets are all from the same collection as the lectotype or separate collections has not been ascertained.

18. Corchorus subargentus* Halford **sp. nov.** quoad staturam et formam foliorum *C. sidoidi* subsp. *rostrisepalo* et *C. obclavato* similis autem ab utroque fructibus erectis

* should be '***subargenteus***' (PDB 2005)

non pendulis differt. *Corchorus subargenteus* maxime arcte affinis *C. sublato* et *C. leptocarpo*; ab illo floribus majoribus (sepalis 10–11 mm longis, petalis 8–10 mm longis, filamentis staminalibus 5–6 mm longis, stylo 5–6 mm longo comparitis sepalis 7–9 mm longis, petalis 4–6 mm longis, filamentis staminalibus 3–4 mm longis, stylo 2–3 mm longo), indumentum caulium foliorumque (10–11 mm longis non 12–14 mm longis) petalis angustioribus (2–3 mm latis non c. 7 mm latis), filamentis staminalibus brevioribus (5–6 mm longis non 7–9 mm longis) differt. **Typus:** Queensland. North Kennedy: 13 km along Laroona road, off Paluma to Ewan road, 19°11', 145°55', 15 April 1996, *P.I. Forster* PIF18983 & *T. Ryan* (holo: BRI; iso: MEL, distribuendi).

Shrub to 2 m high; stems sparingly to much branched, erect; young shoots with silvery-grey or ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts silvery-grey, dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.6 mm across; stipes white or red-brown, straight, up to 0.2 mm long; rays pliable, white or ferruginous, up to 0.4 mm long. Leaves with petioles 5–7 mm long; stipules subulate-linear, 2–3 mm long; lamina narrowly ovate, 3–8 cm long, 1–1.5 cm wide, l:w ratio 3–5.3:1, discolorous; base rounded; margin serrulate; apex rounded. Inflorescences umbellate or racemose, 5–7-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 7–15 mm long; pedicels 2–7 mm long, spreading to erect in flower, erect in fruit; bracts subulate-linear, 2–4 mm long. Flower-buds obovoid-ellipsoid, 3–4 mm across, slightly longitudinally ridged; apex acute with 5 spreading caudae up to 1 mm long. Sepals 5, not persistent, narrowly obovate, 10–11 mm long, c. 2 mm wide; abaxial surface with a dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex caudate, up to 2 mm long. Petals 5; lamina narrowly obovate, 8–10 mm long, 2–3 mm wide, glabrous; claw c. 0.7 mm long, stellate-pubescent on margins. Androgynophore c. 0.2 mm long; annulus entire, c. 0.1 mm long, glabrous. Stamens 60–70; filaments 5–6 mm long; anthers c. 0.5 mm long. Ovary cylindrical, 0.9–1 mm across, densely stellate-puberulous, 3-locular, with 34–38 ovules in each locule; style 5–6 mm long. Fruits subcylindrical, 20–50 mm long, 2–2.5 mm across, 7–20 times longer than wide, ± circular in transverse section, erect , ± straight, slightly constricted between seeds, 3-valved; apex attenuate, 1–2 mm long, orientated upward; indumentum moderately dense to dense, of stellate hairs up to 0.1 mm long. Seeds compressed obovoid or columnar; 1–3 mm long. **Fig. 13.**

***Additional specimens*: Queensland.** North Kennedy District: 2.8 km S of Running River on Ewan–Laroona road, Feb 1996, *Cumming* 7548 (BRI).

***Distribution and habitat*:** *Corchorus subargentus* is confined to north-eastern Queensland where it is known only from the Running River area, approximately 90 km W of Townsville (**Map 3**). It is recorded as growing in eucalypt woodland with *Triodia* sp. in the understorey, on sandy soils on granite-quartz ridges.

***Phenology*:** Flowers have been collected in February and April, fruits in April.

***Affinities*:** *Corchorus subargentus* is similar in stature and leaf size to *C. sidoides* subsp. *rostrisepalus* and *C. obclavatus*. *Corchorus subargentus* differs from both of these by having erect rather than pendulous fruit. *Corchorus subargentus* is most closely related to *C. subulatus* and *C. leptocarpus*. It differs from *C. sublatus* by having larger flowers (sepals 10–11 mm long, petals 8–10 mm long, staminal filaments 5–6 mm long, style 5–6 mm long compared with sepals 7–9 mm long, petals 4–6 mm long, staminal filaments 3–4 mm long, style 2–3 mm long), slightly coarser indumentum on the stems and leaves, and longer and stouter peduncles (7–15 mm long compared with 2–5 mm long). *Corchorus subargentus* differs from *C. leptocarpus* by having a more slender stature and shorter sepals (10–11 mm long compared with 12–14 mm long), narrower petals (2–3 mm wide compared with c. 7 mm wide) and shorter staminal filaments (5–6 mm long compared with 7–9 mm long).

Fig. 13. ***Corchorus subargentus.*** A. branchlet with flower buds and fruit. × 1. B. fruit. × 1.5. C. ventral view of sepal. × 4. A & B from *Forster* PIF18983 (BRI); C from *Cumming* 7548 (BRI). Del. W. Smith.

***Etymology*:** The specific epithet is from the Latin *sub-* somewhat, *argentea,* silvery, and is in reference to the appearance of the foliage of this species.

19. Corchorus sublatus Halford **sp. nov.** quoad staturam et amplitudinem foliorum *C. sidoidi* subsp. *rostrisepalo* et *C. obclavato* similis autem autem ab utroque fructibus erectis non pendulis differt. Per charactereum eius fructuum *C. sublatus*, *C. leptocarpo* et *C. subargenteo* similis. Ab eis *C. sublatus* floribus minoribus fructibus angustioribus differt (vide tabulam 1 pro comparationibus). Addite *C. sublatus* a subargenteo indumento tenuiore pedunculis brevioribus (2–5 mm longis non 7–15 mm longis) differt. **Typus:** Northern Territory. Darwin and Gulf Region: Baroalba Spring, Kakadu NP, 16 April 1992, *D. Halford* Q1114 (holo: DNA; iso: BRI, L, MEL, distribuendi).

Shrub to 1.5 m high; stems sparingly to much branched, erect; young shoots with grey-white or ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.2 mm across; stipes white, straight, up to 0.2 mm long; rays pliable, white or ferruginous, up to 0.1 mm long. Leaves petioles 5–15 mm long; stipules subulate-linear, 3–5 mm long; lamina narrowly ovate or rarely narrowly oblong, 3–11 cm long, 0.7–2.5 cm wide, l:w ratio 4–5.5:1, discolorous; base rounded or rarely attenuate; margin serrulate; apex acute. Inflorescences umbellate, 6–8-flowered, leaf-opposed or lateral, solitary at upper nodes; peduncles 2–5 mm long; pedicels 2–5 mm long, spreading to erect in flower, spreading to recurved in fruit; bracts subulate-linear, 3–5 mm long. Flower-buds obovoid-ellipsoid, 4–5 mm across, longitudinally ridged; apex acute with 5 spreading caudae up to 2 mm long. Sepals 5, not persistent, narrowly obovate, 7–9 mm long, 1–2 mm wide; abaxial surface with a moderately dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex caudate, up to 3 mm long. Petals 5; lamina narrowly obovate to obovate, 4–6 mm long, 2–4 mm wide, glabrous; claw 0.7–1 mm long, stellate-pubescent on margins. Androgynophore 0.3–0.6 mm long; annulus sinuate or entire, 0.2–0.3 mm long, glabrous. Stamens 40–60; filaments 3–4 mm long; anthers c. 0.5 mm long. Ovary cylindrical, 0.7–0.8 mm across, densely stellate-puberulous, 3-locular, with 20–26 ovules in each locule; style 2–3 mm long. Fruits subcylindrical, 20–50 mm long, 1–2 mm across, 10–25 times longer than wide, erect, straight or if on recurved pedicels then abruptly bent near base so that the fruit is perpendicular with the apex pointing upwards, circular in transverse section, slightly constricted between seeds, 3-valved; apex attenuate, 1–2 mm long; indumentum moderately dense to dense of stellate hairs up to 0.2 mm long. Seeds compressed obovoid or columnar; 1–3 mm long. **Fig. 14.**

***Selected specimens (from 8 examined)*: Northern Territory.** Darwin and Gulf Region: Kakadu NP, Baroalba Springs, May 1983, *Fryxell & Craven* 4270 (CANB, DNA); Baroalba Spring, Kakadu NP, Apr 1992, *Halford* Q1131 (BRI); near mouth of Sawcut Gorge, 28.5 km SSE of Jabiru East, Jun 1980, *Craven* 6279 (CANB); c. 7 miles [c. 11 km] W of Mt Gilruth, Mar 1973, *Lazarides* 7951 (BRI, CANB, DNA, NSW); 1 km upstream from Twin Falls, Mar 1988, *Fensham* 880 (DNA).

Table 2. Morphological comparison of *Corchorus sublatus*, *C. subargentus* and *C. leptocarpus*.

Characters	*C. sublatus*	*C. subargentus*	*C. leptocarpus*
sepals (mm)	7–9 × 1–2	10–11 × c. 2	12–14 × c. 3
petals (mm)	4–6 × 2–4	8–10 × 2–3	8–10 × c. 7
fruits width (mm)	1–2	2–3	2–3

Fig. 14. ***Corchorus sublatus.*** A. branchlet with flowers. × 1. B. fruit. × 3. C. ventral view of sepal. × 6. A from *Halford* Q1114 (BRI); B, C from *Halford* Q1112 (BRI). Del. W. Smith.

***Distribution and habitat*:** *Corchorus sublatus* is confined to Arnhem Land in the Northern Territory, from Mt Gilruth southwards to Twin Falls (**Map 6**). It is recorded as growing in heathland, woodland and open forest communities on sandy soils on talus slopes or on gravelly soils on sandstone plateaus.

***Phenology*:** Flowers have been collected in March and April, fruits from April to June.

***Affinities*:** *Corchorus sublatus* is similar in stature and leaf size to *C. sidoides* subsp. *rostrisepalus* and *C. obclavatus*. *Corchorus sublatus* differs from both of these by having erect rather than pendulous fruit. In this character *C. sublatus* resembles *C. leptocarpus* and *C. subargentus*. *Corchorus sublatus* differs

from both of these species by having smaller flowers and narrower fruits (see Table 2 for comparison). In addition, *C. sublatus* differs from *C. subargentus* by having a finer indumentum and shorter peduncles (2–5 mm long compared with 7–15 mm long).

***Etymology*:** The specific epithet refers to the orientation of the fruit; Latin *sublatus* raised aloft.

20. Corchorus tectus Halford **sp. nov.** a *C. sericeio* foliis anguste oblongis usque oblongis distinguenda. **Typus:** Western Australia. Fortescue District: 53 miles [c. 85 km] S of Roebourne on Wittenoom road, 3 March 1962, *A.S. George* 3488 (holo: PERTH).

Open shrub to 70 m high; stems much branched, spreading. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of mostly stellate hairs but dendritic-stellate hairs also present. Stellate hairs sessile or stipitate, up to 1 mm across; stipes red-brown or white, straight or tortuous, up to 0.2 mm long; rays soft to pliable, white, up to 0.6 mm long. Dendritic-stellate hairs up to 0.5 mm long; stipes white or red-brown, tortuous; rays pliable, white, up to 0.6 mm long. Leaves with petioles 7–15 mm long; stipules subulate-linear, 1–3 mm long; lamina narrowly oblong to oblong, 2–4.5 cm long, 0.6–1.5 cm wide, l:w ratio 2.8–3.5:1, discolorous or concolorous; base obtuse to rounded or rarely cordate; margin crenulate; apex acute to rounded. Inflorescences umbellate or racemose, 4–8-flowered, leaf-opposed, solitary at upper nodes; peduncles 1–10 mm long; pedicels 1–7 mm long, spreading to erect in flower and fruit; bracts subulate-linear, 2–5 mm long. Flower buds ellipsoid, 2–4 mm across; apex obtuse with 5 spreading caudae to 2 mm long. Sepals 5, persistent, narrowly obovate-elliptic, 5–6.5 mm long, 1–1.5 mm wide; abaxial surface with a dense indumentum of stellate and dendritic-stellate hairs, the largest hairs up to 1 mm long; adaxial surface villose proximally, glabrous distally; apex caudate, up to 2 mm long. Petals 5; lamina obovate, 5–7 mm long, 3–5 mm wide, glabrous; claw 0.7–0.8 mm long, sparsely pubescent. Androgynophore 0.1–0.3 mm long; annulus entire, 0.2–0.4 mm long, glabrous. Stamens 45–95; filaments 2.5–5.5 mm long; anthers c. 0.5. Ovary globose, 1.5–2 mm across, densely stellate-tomentose, 3-locular, with 2–8 ovules in each locule; style 3–5 mm long. Fruits globose, 2–4 mm across, circular in transverse section, not constricted between seeds, 3-valved; apex rounded rarely obtuse; indumentum dense of stellate hairs up to 0.7 mm long. Seeds compressed obovoid, 1.2–1.8 mm long. **Fig. 15.**

***Selected specimens (from 11 examined)*: Western Australia.** Fortescue District: Robe R., between Onslow and Roebourne, Aug 1966, *Butler* 20 (PERTH); Fortescue R., Jun 1878, *Forrest* s.n. [MEL227315] (MEL); Fortescue R., 1895, *Cusack* s.n. [MEL560600] (MEL); Roebourne, 1897, *Cusack* s.n. [MEL1599108] (MEL); 3 km NE of Three Peak Hills, Pannawonica road, Mar 1984, *Newbey* 9889 (PERTH); Hamersley Range, Aug 1958, *Ride* s.n. [PERTH 1524739] (PERTH); Hamersley Range, *Ride* s.n. [PERTH 1524690] (PERTH).

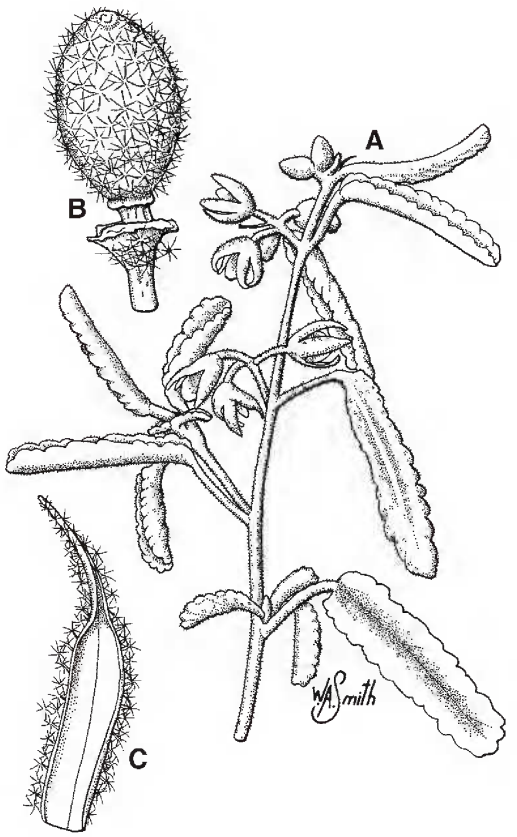

Fig. 15. ***Corchorus tectus.*** A. branchlet with flowers. × 1. B. fruit with persistent sepals removed. × 6. C. ventral view of sepal. × 6. A from *van Leeuwen* 4376 (BRI); B, C from *Bulter* 20 (BRI). Del. W. Smith.

***Distribution and habitat*:** *Corchorus tectus* occurs in north-western Western Australia, from Robe River eastward to near Millstream Station (**Map 7**). It is recorded as growing in open shrubland communities on gravelly soils along watercourses.

***Phenology*:** Flowers have been collected in March, June, August and September, fruits in March and August.

***Affinities*:** *Corchorus tectus* is similar to *C. sericeus* but differs from that by having narrowly oblong to oblong leaves.

***Etymology*:** The specific epithet is from Latin *tectus*, meaning 'covered', in reference to the persistent calyx lobes that cover the fruit of this species.

21. Corchorus tomentellus F.Muell., Fragm. 3: 10 (1862). **Type:** [Queensland.] Mackenzie River, [without date,] *F. Mueller* s.n. [lecto, here chosen: MEL [MEL220813]).

Shrub to 0.3 m high; stems much branched, spreading. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense, comprised of stellate hairs. Stellate hairs sessile or stipitate, up to 0.7 mm across; stipes red-brown, straight, up to 0.3 mm long; rays firm, white, up to 0.5 mm long. Leaves with petioles 3–5 mm long; stipules subulate-linear, 1–3 mm long; lamina ovate, 1.5–3.5 cm long, 0.8–2 cm wide, l:w ratio 1.3–2.2:1, discolorous; base rounded; margin serrate; apex acute to obtuse. Inflorescences umbellate, 2 or 3-flowered, leaf-opposed, solitary at upper nodes; peduncles 1–2 mm long; pedicels 2–4 mm long, spreading to erect in flower, recurved in fruit; bracts subulate-linear, 1–3 mm long. Flower buds ellipsoid, 2–3 mm across, apex acute. Sepals 5, not persistent, narrowly obovate, 6–7 mm long, 1–2 mm wide; abaxial surface with a moderately dense indumentum of stellate hairs up to 0.5 mm long; adaxial surface stellate-pubescent proximally, glabrous distally; apex acute to acuminate, up to 0.4 mm long. Petals 5; lamina obovate, 5–7 mm long, 2–5 mm wide, glabrous; claw c. 0.7 mm long, stellate-pubescent on abaxial surface and margins. Androgynophore 0.3–0.4 mm long; annulus entire, c. 0.2 mm long, glabrous. Stamens 50–60; filaments 2–4 mm long; anthers 2–4 mm long. Ovary cylindrical; c. 0.8 mm across, densely stellate-puberulous, 2 or 3-locular, with c. 26 ovules in each locule; style c. 3 mm long. Fruits subcylindrical, 15–65 mm long, 0.7–1.5 mm across, 7–35 times longer than wide, pendulous, straight or slightly curved, circular in transverse section, markedly constricted between seeds, 2 or 3-valved; apex acute or attenuate, 1–3 mm long, orientated downward; indumentum moderately dense to dense, of stellate hairs up to 0.4 mm long. Seeds compressed obovoid, c. 2 mm long.

***Selected specimens (from 18 examined)*: Queensland.** South Kennedy District: tributary of Hazelwood Creek near pipeline, Apr 1978, *Byrnes & Clarkson* 3779 (BRI). Leichhardt District: near Lake Elphinstone, Jan 1993, *Fensham* 441 (BRI) Carborough Range, 1 km NW of Lake Elphinstone outlet, *Telford* 11125 & *Rudd* (BRI); telecom road, 14 km E of Comet, *Bean* 7520 & *Forster* (BRI); South Blackwater Mine, Laleham, Jan 1986, *Thompson* s.n. [AQ399040] (BRI); South Blackwater Mine, Dec 1990, *Thompson* 10 (BRI); Brigalow Research Station, 30 km NW of Theodore, Apr 1977, *Johnson* 3517 & *Batianoff* (BRI); Brigalow Research Station, 32 km NW of Theodore, Jul 1970, *Johnson* 2890 (BRI); 'Humboldt', 45 km NE of Rolleston, *Bean* 9573 (BRI); near 'Moorooloo', E of Springsure, *Bean* 14172 (BRI). Burnett District: "Narayen", Mundubbera, Feb 1967, *Tothill* N325 (BRI); "Narayen" about 30 miles [c. 48 km] W of Mundubbera, Feb 1968, *Tothill* N443 (BRI).

***Distribution and habitat*:** *Corchorus tomentellus* occurs in subcoastal areas of central and southern Queensland from near Nebo southward to Mundubbera (**Map 3**). It is recorded as growing in shrubland, eucalypt woodland and eucalypt open forest communities on sandy soils or in brigalow open forest communities on clay soils.

***Phenology*:** Flowers have been collected in April, October and from December to March, fruits in April, July, October and from December to March.

***Typification*:** In the protologue of *Corchorus tomentellus*, Mueller (1862) did not cite any particular collection but stated "In graminosis herbidis ad flumina Dawson et MacKenzie". A single collection [MEL220813] (Mackenzie River, trop. Austr.) which can be considered part of the original material that Mueller used to draw up his description of this species has been located at MEL. The collection has flowers

and is chosen as the lectotype to Mueller's name *C. tomentellus*.

Notes*: *Corchorus tomentellus is closely related to *C. sidoides* but can be distinguished from that by its generally sparser indumentum on most parts, relatively broader and shorter leaves and generally narrower fruit.

22. Corchorus walcottii F.Muell., Fragm. 3: 9 (1862); *Corchorus walcottii* F.Muell. var. *walcottii*, Benth., Fl. Austral. 1: 279 (1863). **Type:** [Western Australia.] Hearson Island, *P. Walcott* (lecto, here chosen: MEL [MEL223678]).

Corchorus sp. Burrup (G.Craig 235), Paczkowska & Chapman (2000).

Shrub to 1.5 m high; stems much branched, spreading. Indumentum on young shoots, branchlets, leaves, stipules, peduncles, pedicels and bracts grey-white, moderately dense to dense, comprised of mostly stellate hairs but simple and dendritic-stellate hairs also present. Stellate hairs sessile or stipitate, up to 1.5 mm across; stipes, white, straight, up to 0.5 mm long; rays soft, white, up to 1.5 mm long. Dendritic-stellate hairs up to 2 mm long; stipes white or red-brown, tortuous; rays soft, white, up to 0.5 mm long. Simple hairs glandular, dull yellow, flexuous, 1–4 mm long. Leaves with petioles 7–30 mm long; stipules subulate-linear, 4–25 mm long; lamina narrowly ovate to broadly ovate, 3–9 cm long, 2.5–6 cm wide, l:w ratio 1.2–2.5:1, concolorous; base rounded or slightly cordate; margin serrate; apex obtuse to rounded. Inflorescences umbellate, 3–5-flowered, leaf-opposed, solitary at nodes; peduncles 5–25 mm long; pedicels 5–20 mm long, spreading to erect in flower and fruit; bracts narrowly ovate, 2–17 mm long. Flower-buds globose, 7–10 mm across; apex obtuse usually with 5 spreading caudae up to 2 mm long. Sepals 5, not persistent, narrowly obovate-elliptic, 8–18 mm long, 3–5 mm wide; abaxial surface with a very dense indumentum of mostly stellate and simple hairs but dendritic-stellate hairs occasionally present, the largest hairs up to 1.5 mm long; adaxial surface stellate hairy over whole surface or restricted to the proximal third; apex acute, acuminate or caudate, 1–4 mm long. Petals 5; lamina obovate to broadly obovate, 7–13 mm long, 6–10 mm wide, glabrous; claw 0.3–1 mm long, stellate pubescent on abaxial surface and margins. Androgynophore c. 0.2 mm long; annulus entire, c. 0.2 mm long, glabrous. Stamens 80–180; filaments 3–7 mm long; anthers c. 0.5 mm long. Ovary subglobose or shortly pentagonal-cylindrical, c. 1.8 mm across, densely stellate-tomentose, 5-locular, with 24–26 ovules in each locule; style 3–7 mm long. Fruits narrowly ovoid-ellipsoid or subcylindrical, 7–25 mm long, 3–9 mm across, 2–5 times longer than wide, straight or slightly curved, circular in transverse section, not constricted between seeds, 4 or 5-valved; apex rounded; indumentum dense of dendritic-stellate and a few simple glandular hairs, the largest hairs up to 2 mm long. Seeds compressed obovoid, c. 2 mm long. **Fig. 16.** Chromosome No. 2n = 14 (Islam & Qaiyum 1961; Datta *et al.* 1966).

***Selected specimens (from 35 examined)*: Western Australia.** Fortescue District: 2 km S of landing strip, Barrow Island, May 1964, *Goodall* 1520 (PERTH); Sholl Island, Oct 1949, *Serventy* s.n. [PERTH1521519] (PERTH); Dolphin Island, Dampier Archipelago, Jun 1962, *Royce* 7169 (PERTH); Dampier turnoff (south), Nov 1979, *Demarz* 2864 (PERTH); North West Coastal Highway, c. 15 km by road WSW of main turnoff to Dampier, c. 8 km by road ENE of Karratha Homestead turnoff, Aug 1977, *Jackson* 3034 (AD); 5 km NE of George R. crossing of North West Coastal Highway, 42 km from Roebourne, Aug 1977, *Telford* 6547 (CANB); Karratha, Jul 1981, *Craig* 235 (PERTH); Pt Samson, Jul 1981, *Craig* 212 (PERTH); Woodstock Station, (S of Port Hedland), May 1958, *Burbidge* 5974 (AD, PERTH); Woodstock Station, Apr 1958, *Burbidge* 5811 (AD, PERTH); 90 km N of Nullagine, Great Northern Highway, May 1979, *Mitchell* 1245 (PERTH). **Northern Territory.** Central Northern Region: Mongrel Downs, Apr 1971, *Dunlop* 2105 (AD, BRI, MEL); S of Mongrel Downs Station, Aug 1976, *Latz* 8211 (DNA, MEL); Tanami Desert, 8 km NE of Sangsters Bore, Sep 1978, *Henshall* 2276 (AD, DNA); 42 miles [c. 68 km] NW of Chilla Well, Jul 1970, *Dunlop* (DNA). Central Southern Region: 8.4 km E of W.A. Border on Kintore road, Apr 1988, *Leach* 1950 (CANB); Mt Liebig, 168 miles [c. 269 km] W of Alice Springs, Jul 1966, *Willis* s.n. (DNA, MEL); Mt Liebig, north side, ± 210 km WNW of Alice Springs, Jun 1974, *Carr* 2368 & *Beauglehole* 46147 (MEL); ± 6.4 km NNW of Mt Zeil, Jul 1968, *Beauglehole* 27181 (MEL).

***Distribution and habitat*:** *Corchorus walcottii* has a disjunct distribution. It occurs in the Pilbara region, Western Australia, from Barrow Island to near Marble Bar, and in central Australia from the Tanami Desert in the Northern Territory southwards to Mt Agnes in the north-west of South Australia (**Map 2**). It is recorded as growing in hummock grassland, shrubland and low open woodland communities, on sandy or loamy soils

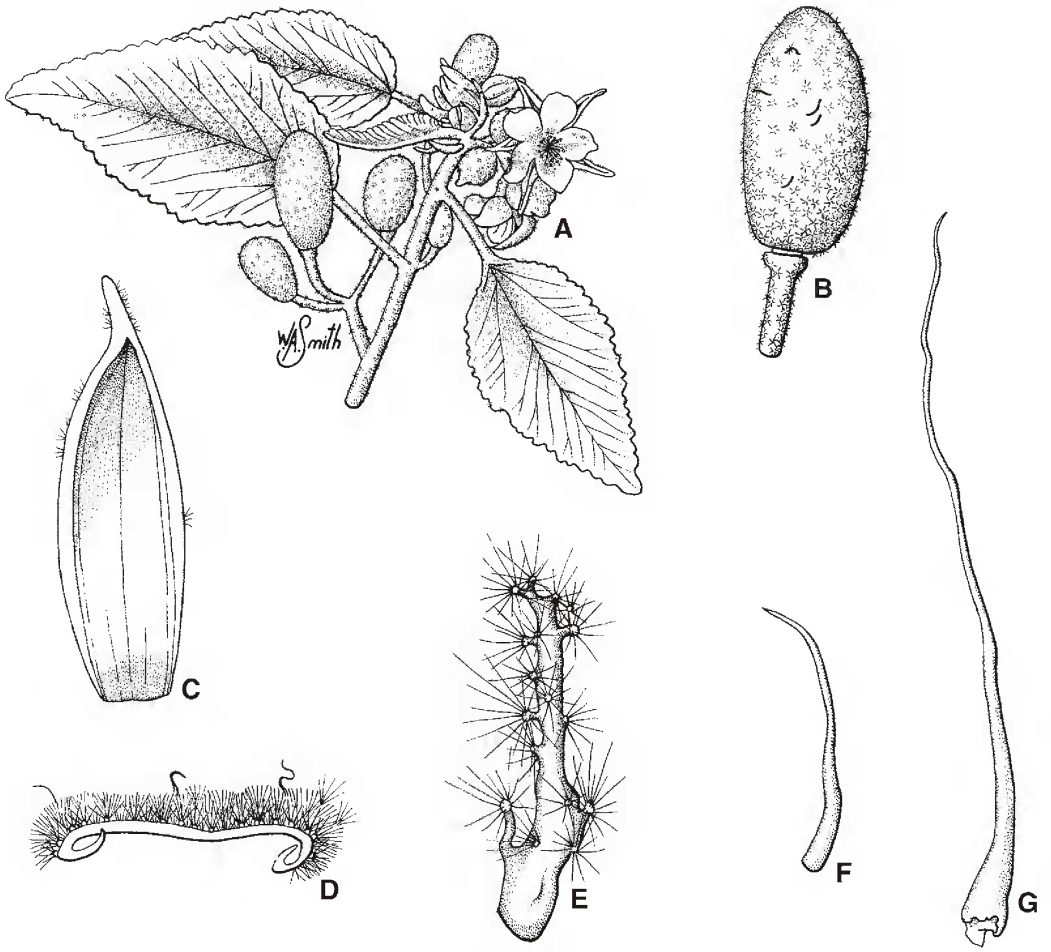

Fig. 16. ***Corchorus walcottii.*** A. branchlet with flower and fruit. × 1. B. fruit. × 02. C. ventral view of sepal. × 6. D. cross-section of sepal. × 12. E. dendritic-stellate hair. × 24. F. simple glandular hair. × 48. G. simple glandular hair. × 24. A–F from *Telford* 6547 (CANB); G from *Burbidge* 5811 (PERTH). Del. W. Smith.

sometimes associated with limestone, on plains and hills. It is also recorded on coastal dunes.

***Phenology*:** Flowers have been collected in March, April, June, July, September and November, fruits in March, April, June and November.

***Typification*:** In the protologue of *Corchorus walcottii*, Mueller (1862) cited two collections "in collibus altioribus rupestribus prope Nickol Bay et in Hearson island. P. Walcott" The two collections referred to by Mueller in his protologue were located amongst material on loan to BRI from MEL "elevated rocky hills, Nichol Bay [MEL223677] and "growing on top of rocky sandstone hill, Hearson island" [MEL223678]. The specimen collected from Hearson Island is selected as lectotype as it is the better preserved specimen with flowers and fruits attached.

***Affinities*:** *Corchorus walcottii*, *C. parviflorus* and *C. laniflorus* have conspicuous simple glandular hairs present amongst the dense stellate indumentum on the stems, leaves and inflorescences.

For differences with *C. parviflorus* and *C. laniflorus* refer to 'Notes' under those species.

Notes*: *Corchorus walcottii as treated here is a variable species. The central Australian populations are somewhat different in having a shorter indumentum on the leaves from the typical form of this species from the Pilbara. There is another form on the islands off the Pilbara coast that has smaller leaves and flowers than the typical form, but it intergrades with the typical material of this species.

Excluded names

Corchorus allenii F.Muell., Proc. Linn. Soc. N.S.W. ser.2 6: 462 (1892). **Type:** near Prince Regent River; Bradshaw & Allen (holo: MEL) = ***Helicteres*** sp. (Sterculiaceae)

Corchorus longipes Tate, Transactions of the Royal Society of S.A. 22: 119 (1898). **Type:** Mt Lyndhurst Run near Farina, S.A., 1898, Max Koch s.n. (holo: AD) = ***Gilesia biniflora*** F.Muell. (Sterculiaceae).

Corchorus pachyphyllus Burret, Notizbl. Bot. Gart. Berlin, 12: 166 (1937). **Type citation:** [Western Australia.] Gascoyne, nördlich bei Carnarvon, c. 25 miles ü. d. M. Sandige Hügel mit lichtem Gebüsch, L. Diels 3718; *n.v.*

The type of this species has apparently been destroyed in Berlin during the Second World War and I have been unable to locate any material that may be considered an isotype. The description and discussion in Burret's protologue for this species is lengthy but it has not been possible to say to which known species it is referable.

Corchorus rothii F.Muell., Second Systematic Census of Australian Plants. 30 (1889), *nom. illeg.* **Type:** based on ***Triumfetta pilosa*** Roth.

Acknowledgements

I would like to thank Gordon Guymer, Director of BRI, for making working space and facilities at BRI available to me, the directors and curators of AD, CANB, DNA, K, MEL, NSW, P and PERTH for the loan of their holdings for study at BRI. The following persons provided assistance and they are thanked sincerely for their efforts; Laurie Jessup and Greg Leach for assistance while they were Australian Botanical Liaison Officer at K, Will Smith (BRI) for the illustrations and maps and Les Pedley for the translation of the diagnoses into Latin. This work was supported by grants from the Australian Biological Resource Study, Environment Australia in 1991, 1992 and 1994, which are gratefully acknowledged.

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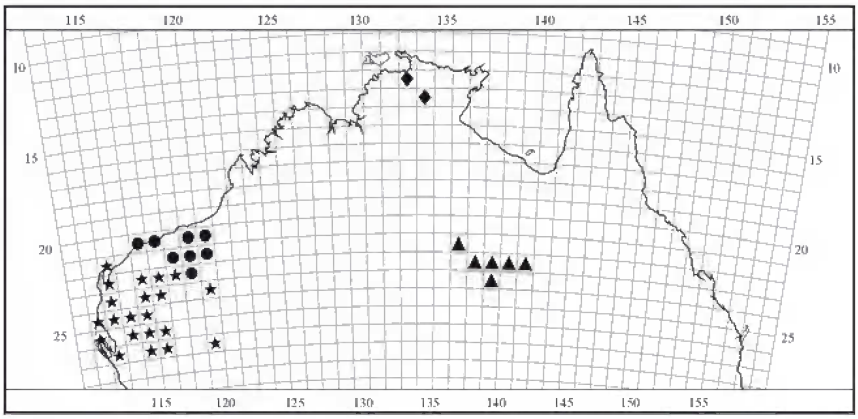
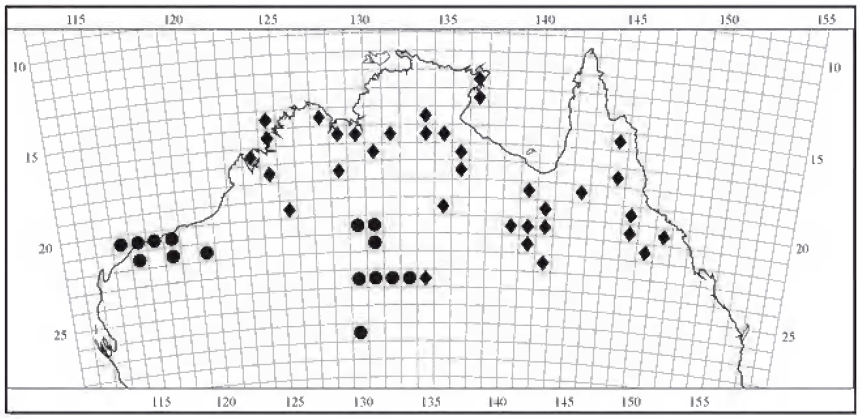
Index to Scientific Names

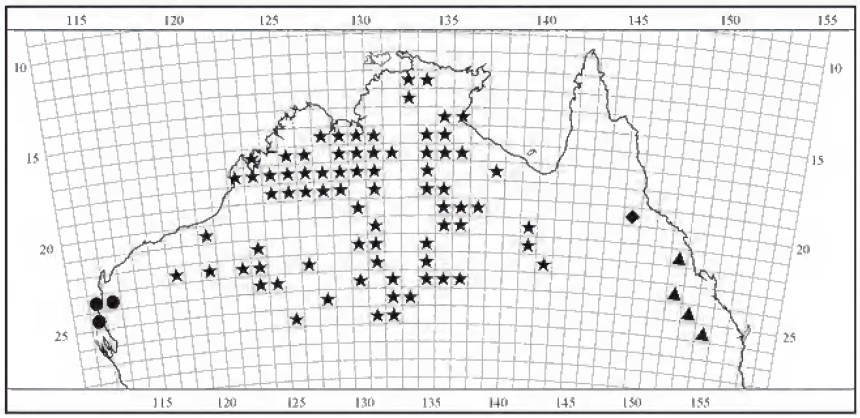
Names in bold type are accepted names and those in light are synonyms, etc. The numbers refer to the number of the species accepted in the above taxonomic treatment. 'Excl.' refers to a name listed under Excluded names.



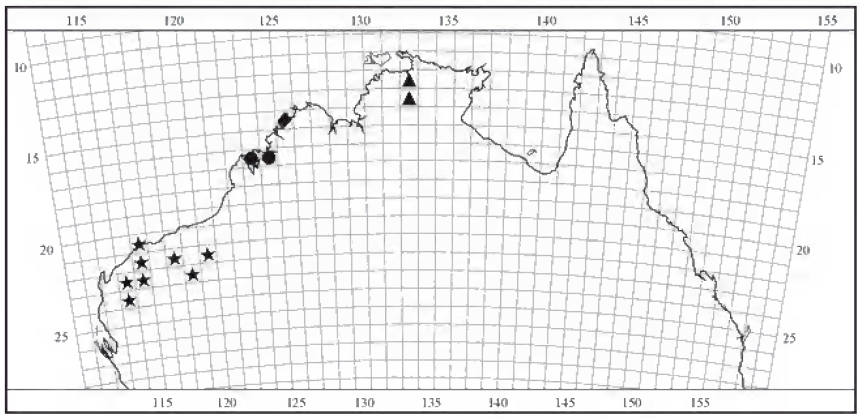
Map 1. Distribution of *Corchorus* spp. *C. parviflorus* ● , *C. crozophorifolius* ★ , *C. elderi* ▲ , *C. obclavatus* ♦ .



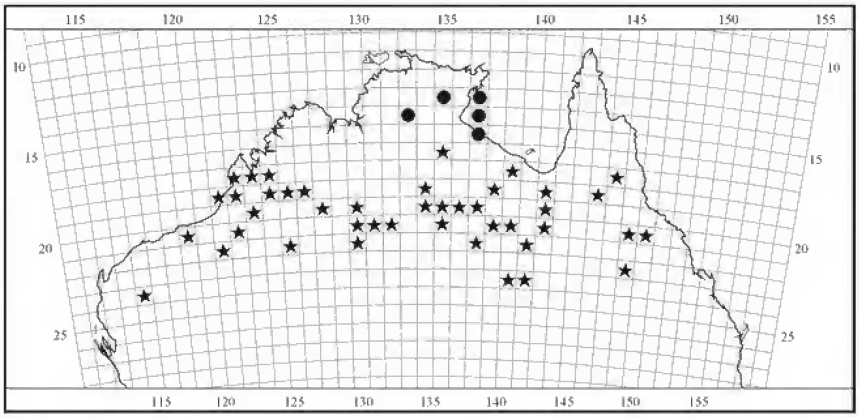
Map 2. Distribution of *Corchorus* spp. *C. walcottii* ● , *C. pumilio* ◆ .



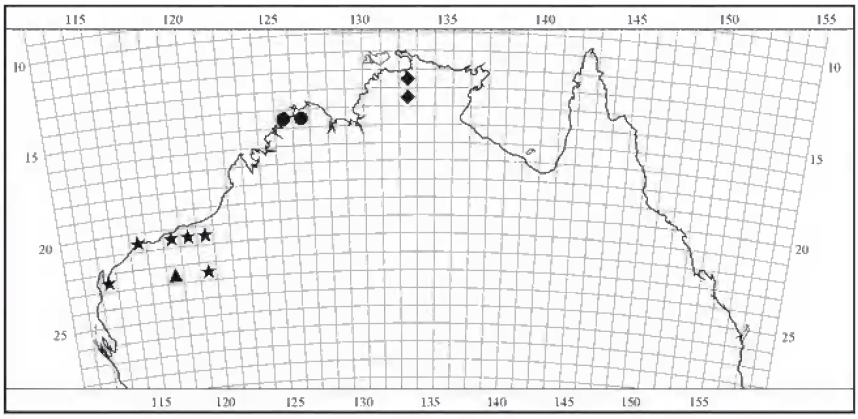
Map 3. Distribution of *Corchorus* spp. *C. sidoides* subsp. *sidoides* ★ , *C. carnarvonensis* ● , *C. tomentellus* ▲ , *C. subargentus* ◆ .



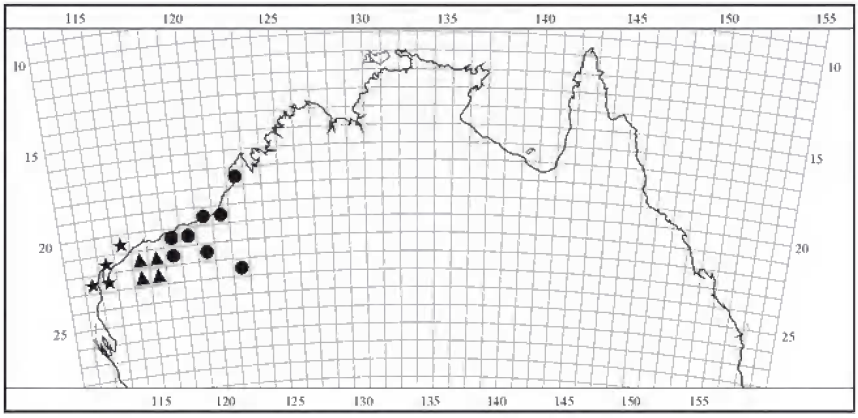
Map 4. Distribution of *Corchorus* spp. *C. laniflorus* ★ , *C. puberulus* ● ,*C. mitchellensis* ◆ , *C. aulacocarpus* ▲ .



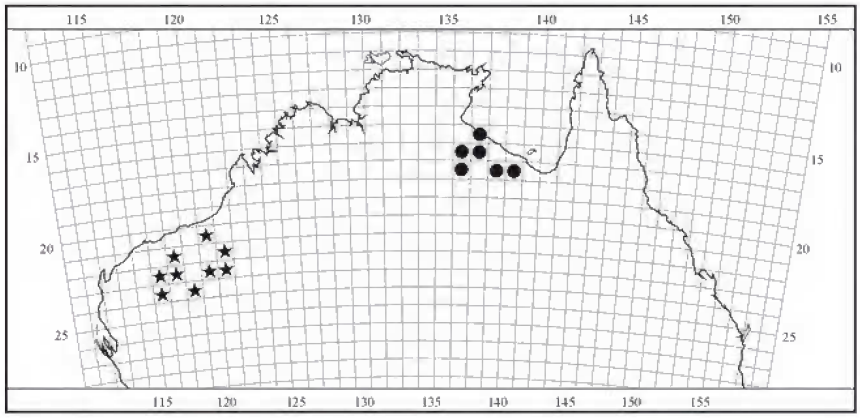
Map 5. Distribution of *Corchorus* spp. *C. sidoides* subsp. *vermicularis* ★ , *C. sidoides* subsp. *rostrisepalus* ● .



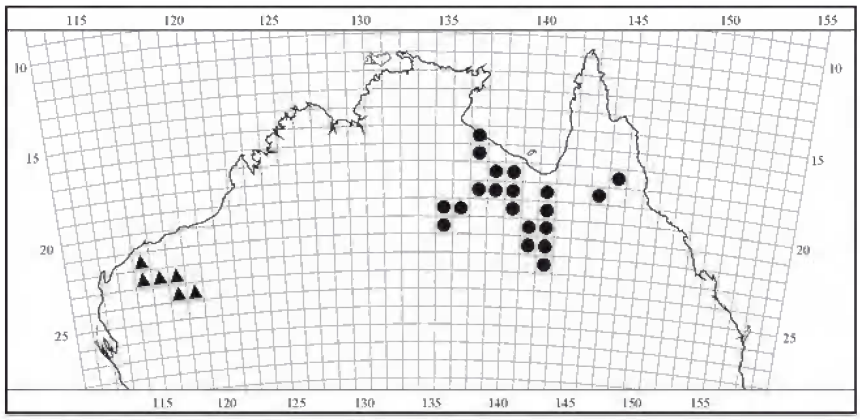
Map 6. Distribution of *Corchorus* spp. *C. elachocarpus* ★ , *C. incanus* subsp. *lithophilus* ▲ , *C. leptocarpus* ● , *C. sublatus* ◆ .



Map 7. Distribution of *Corchorus* spp. *C. incanus subsp. incanus* ● , *C. congener* ★ , *C. tectus* ▲ .



Map 8. Distribution of *Corchorus* spp. *C. lasiocarpus* subsp. *lasiocarpus* ★ , *C. sericeus* subsp. *sericeus* ● .



Map 9. Distribution of *Corchorus* spp. *C. lasiocarpus* subsp. *parvus* ▲ , *C. sericeus* subsp. *densiflorus* ● .